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MONTHLY METALLURGICAL SECTION.—Lithium: Its Extraction, Properties and Uses, by Dr. G. M. Dyson

25-30

NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

The prepaid subscription to THE CHEMICAL AGE is 21s. per annum for the United Kingdom, and 26s. abroad. Cheques, Money Orders, and Postal Orders should be made payable to Benn Brothers, Ltd.

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Fertiliser Prices

THE fertiliser market has been waiting anxiously for some time for an announcement regarding the season's prices for sulphate of ammonia. It is now announced by Nitram, Ltd. that for the season 1929-30 sulphate of ammonia will be supplied, for home agricultural use, at the following prices for delivery in the months indicated:—October, £9 11s.; November, £9 14s.; December, £9 17s. per ton, for neutral quality guaranteed to contain 20.6 per cent. of nitrogen by weight and not more than 0.025 per cent. free acid (H_2SO_4), delivered to consumer's nearest station or wharf in Great Britain, in lots of 6 tons and upwards. For smaller quantities an extra charge is made, while allowances are made for any delivery not up to the standard laid down above.

In fixing these prices, the 1s. per ton rebate on railway carriage which was allowed during a part of last season, to give buyers the benefit of the Derating Act, has been taken into account, so that in future no rebate or allowance of this nature will be made. Nitram, Ltd., state that as practically no ordinary quality is likely to be available, they do not quote a price for

this quality. It is understood, the announcement adds, that quantities purchased at the prices stated will be used for home agricultural purposes only, and the contracts will contain the following clause:—The buyers undertake that no sulphate of ammonia delivered under this contract shall be exported or sold for export from Great Britain or Ireland (except to the Channel Islands), and, further, the buyers undertake to request an identical undertaking from any buyers to whom they may offer to sell such sulphate of ammonia; further, it is hereby agreed that in respect of any and every ton so sold for export or exported either by the buyers themselves or by the buyers' sub-purchasers, or by any other sub-purchasers, the buyers shall pay to the sellers, in addition to the purchase price thereof, £10 (ten pounds) as and for liquidated damages.

Cotton Research

At the annual meeting of the British Cotton Research Association, on Tuesday, it was announced that the Department of Scientific and Industrial Research has agreed to give further financial assistance to the Association. During the first five years of the existence of the Association the trade subscribed £10,000 per annum; during the second five years, just ended, they subscribed £20,000 per annum. In the opinion of the council, it is necessary to extend the operations of the Association, in view of the natural development and success of the work which has already been done.

An appeal to the trade as a whole has not met with the response which the council hoped for. The position at the moment is that the spinners have agreed to continue their subscriptions at the same rate for the next five years, the manufacturers have agreed to continue their subscriptions at the same rate for only two years, and the finishing end of the trade, almost without exception, together with a number of unfederated members, have agreed to increase their subscriptions to the extent of 50 per cent. In some cases this increased support is conditional upon other sections of the trade following suit. The trustees of the Cotton Trade War Memorial Fund, from whom during the past ten years £265,000 has been received, have made a grant of a further £15,000 a year for the next five years. During the past ten years 36 per cent. of the funds has come from the trade directly by trade subscriptions; 47 per cent. from the Cotton Trade War Memorial Fund, and 17 per cent. from State sources.

It has been represented to the Department of Scientific and Industrial Research that the work accomplished by the Association has been such that considerable development should now be made. The

Department takes the view that it is reasonable for the State to aid new developments, but feels that it is up to the trade itself to accept the responsibility of the continuance of the present operations of the Association. They have come to the same conclusion as the council of the Association, that the time is ripe for the activities of the Association to be increased by some 50 per cent. They have, therefore, made an offer, which was accepted by the council at the last meeting, to make a new grant to the Association. The grant, however, is to be made in such a way as to encourage further support from the trade. Holding the opinion that the income of the Association should be raised from £50,000 to £75,000, the Government will give a grant of £ for £ on all income from approved trade sources in excess of £25,000. The new grant from the Cotton Trade War Memorial Fund will be approved as coming from trade sources, and with the support promised by the trade, the grant-earning income should amount to some £40,000. In other words, the council are now assured of a further Government grant of not less than £15,000 per annum, which means that the yearly income of the Association will be round about £60,000. This falls considerably short of the £75,000 which the council and the Government consider could be profitably spent on the development of the work of the Shirley Institute. The council have authorised a portion of the proposed extension of the Shirley Institute, and this will take the form of experimental workrooms as a counterpart to their scientific laboratories. In view of the numerous difficulties which face the cotton industry, it is comforting to know that the future of its research organisation is assured.

Radium Supplies

THE Radium Commission has, with commendable promptitude, begun its duties. It has been decided that supplies of radium, as placed at the disposal of the Commission by the Radium Trust, will be consigned for safe keeping (pending distribution) to the National Physical Laboratory at Teddington, which will also undertake the testing and measuring of all consignments received from the manufacturers. This is necessarily a slow process, and it is not to be anticipated that more than three grammes, at the most, will be available, in suitable containers ready for use, before the end of the current year. In addition, it is possible that a four gramme "bomb" (for intensive irradiation) may be secured, on loan, from the manufacturers, for a limited period free of charge, and negotiations to this end are now in progress. It has also been decided in principle that loans of radium should, as a rule, be made only on terms which would recoup the Commission for expenses incurred (other than the purchase price of the radium), in order that as little as possible of the National Fund should go in administrative or overhead charges. Other conditions governing loans of radium by the Commission will form the subject of special consideration, but will probably include an obligation to keep detailed and uniform records for the information of the Commission. Professor S. Russ (head of the department of physics at Middlesex Hospital), an eminent authority on the use of radium, has been appointed scientific secretary to the Commission.

The D.S.I.R. Secretaryship

THE work of the Department of Scientific and Industrial Research is now held in such esteem that the resignation of its secretary, Mr. H. T. Tizard, F.R.S. (on his appointment as rector of the Imperial College of Science) immediately gave rise to much conjecture as to his successor. It is now announced that the post will be filled by the appointment of Dr. F. E. Smith, F.R.S., Director of Scientific Research to the Admiralty. Dr. Frank Edward Smith was born in 1876, and educated at the Royal College of Science. He was superintendent of the electrical department at the National Physical Laboratory from 1901 until 1920, when he was appointed to the post at the Admiralty which he is just vacating. He has published numerous papers dealing with his investigations, mainly in regard to electricity and magnetism, and received the Duddell Medal of the Physical Society in 1927. Since 1922, he has held the office of honorary secretary of the British Association for the Advancement of Science. The Department of Scientific and Industrial Research has been singularly fortunate in its secretaries, and Dr. Smith's qualifications and career show that he is well fitted to carry out the onerous duties of his new post.

Books Received

- THE CHEMISTS' CLUB OF NEW YORK, 1926-1929. Pp. 135.
 THE MANUFACTURE OF COMMERCIAL ANHYDROUS ALUMINIUM CHLORIDE. By A. M. McAfee. Reprinted from *Industrial and Engineering Chemistry*. Pp. 6.
 INTERMEDIATE PRACTICAL CHEMISTRY. By Ernest S. Hedges. London: Edward Arnold and Co. Pp. 119. 5s.

The Calendar

| | | |
|--------|---|--|
| Oct. 7 | Institution of the Rubber Industry: "Anti-Oxidants." Dr. W. J. S. Naunton. 7.30 p.m. | Engineers' Club, Coventry Street, London. |
| 7 | Society of Chemical Industry (London Section): "A New Method for the Production of Pure Beryllium Oxide from Beryllium Ores." H. A. Sloman. "Isolation of Helium from Monazite Sand." R. Taylor. 8 p.m. | Burlington House, Piccadilly, London. |
| 8 | Institution of Petroleum Technologists. 5.30 p.m. | House of the Royal Society of Arts, Adelphi, London. |
| 8 | Leicester Literary and Philosophical Society (Chemistry Section): "Alchemy in Art and Literature." R. B. Pilcher. 8 p.m. | College of Technology, Leicester. |
| 8 | Institute of Metals (N.E. Coast Section): Chairman's Address. S. G. Homfray. 7.30 p.m. | Armstrong College, Newcastle-on-Tyne. |
| 9 | Institute of Metals (Swansea Section): Chairman's Address. J. H. Grant. 7 p.m. | Thomas's Café, High Street, Swansea. |
| 10 | Institute of Metals (London Section): "Some Factors in Solidification." Dr. S. W. Smith. 7.30 p.m. | 83, Pall Mall, London. |
| 10 | Institute of Metals (Birmingham Section): "Metals in Aircraft Structures." J. D. North. 7 p.m. | Chamber of Commerce, New Street, Birmingham. |
| 10 | Institute of Chemistry (Liverpool Section): Address by Dr. R. Thomas. | Liverpool. |
| 11 | Chemical Engineering Group: "Rationalisation—Its Meaning and Application." J. Davidson Pratt. 8 p.m. | Burlington House, Piccadilly, London. |
| 11 | Institute of Metals (Sheffield Section): "Some Notes on the Selection of Suitable Metals to Resist Corrosion." F. C. Robinson. 7.30 p.m. | University, Sheffield. |

The Purification of Water by Electro-Osmosis

By A. S. Behrman

The electro-osmose process, widely known as a means of dewatering clays, etc., is also applicable to the purification of water. In the following article (reprinted from "The Journal of Chemical Education") Mr. A. S. Behrman, of the International Filter Co., of Chicago, deals with this aspect of the subject.

It has long been the ambition of chemists engaged in the development of water purification processes to devise chemical means for the complete purification of water—in other words,

treatment available. True, magnesium sulphate may be removed with barium hydroxide, and calcium sulphate with barium carbonate; but these methods are practised so seldom, because of expense, toxicity, and other considerations, that they have no importance in the present discussion.

There remain, then, calcium sulphate, calcium chloride, magnesium sulphate, magnesium chloride, and all the sodium and potassium salts which have hitherto been removable from a water only by distillation.

Electro-osmosis versus Distillation

The new electro-osmotic process (better known commercially as the Electro-Osmose process) and distillation operate on diametrically opposed principles. In distillation, the water, in the form of steam, is pulled away from the solid impurities. In the Electro-Osmose method, the impurities are pulled away from the water.

It is this essential difference in principle which gives to the Electro-Osmose process its great advantages of simplicity and economy of operation within the field in which its use is indicated.

Principle of the Electro-Osmose Process

The principle of the Electro-Osmose process will be readily understood on considering the elimination from water of a typical soluble salt such as sodium chloride. If a direct current is passed through a solution of sodium chloride, the sodium ions will migrate to the cathode, where they will be discharged and form sodium hydroxide. The chloride ions will travel to the anode where they will be discharged and liberated as chlorine.

If no provision is made for the separation of the products of electrolysis, these will react, of course, to form sodium hypochlorite. If, however, the anode and cathode are separated by diaphragms from the liquid being purified, and if the products of electrolysis are kept from contaminating the liquid being treated, in due course the elimination of sodium and chloride ions from this liquid should be complete.

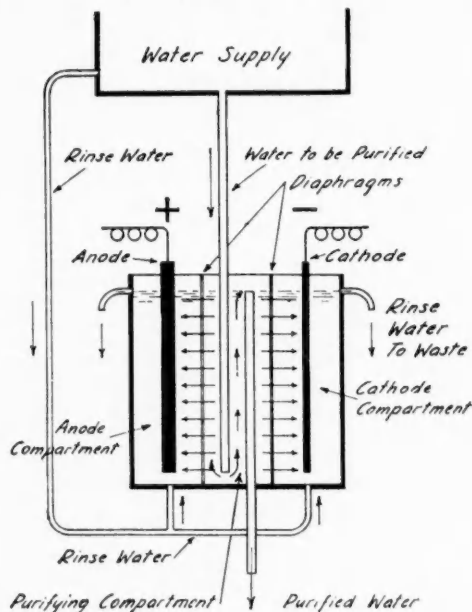


FIG. 1. A TYPICAL THREE-COMPARTMENT CELL.

to obtain the equivalent of distilled water without the necessity for distillation. The problem was finally solved, in its broad aspects, by Graf Botho Schwerin, a German scientist. It has remained for his co-workers and successors to develop important improvements which have made of Count Schwerin's idea a practical commercial reality.

The new process is called, not altogether accurately, "Electro-osmosis." More correctly, as will be seen, the process functions primarily by electrolysis, and to a considerably lesser extent by electro-endosmosis and electrophoresis.

Limitations of Previous Methods

It will probably help us to appreciate the possibilities—and limitations—of the new process if we bear in mind the range of usefulness and maximum efficacy of other methods of reducing the dissolved solid content of a water. The impurities in a normal water consist very largely of the bicarbonates, sulphates, and chlorides of calcium, magnesium, and sodium (and potassium).

If a water contains only the bicarbonates of calcium and magnesium, usually referred to rather loosely as "temporary hardness," proper treatment with lime will remove these impurities bodily in the form of calcium carbonate and magnesium hydroxide, and will reduce the amount of dissolved solids in the water, whatever the initial contents, to about 50 parts per million. This residual solid content represents principally the combined theoretical solubilities of calcium carbonate and magnesium hydroxide, together with a small amount of these substances in colloidal solution.

Iron is also removed bodily from a water by lime treatment, the residual iron in a properly treated water being usually not more than 0.1 part per million. The normal iron content of waters is so small, however, that the effect of its presence or absence on the amount of dissolved solids is usually without significance.

Aside from the bicarbonates of calcium and magnesium, there is no quantitatively important group of impurities which may be removed bodily by the usual methods of chemical

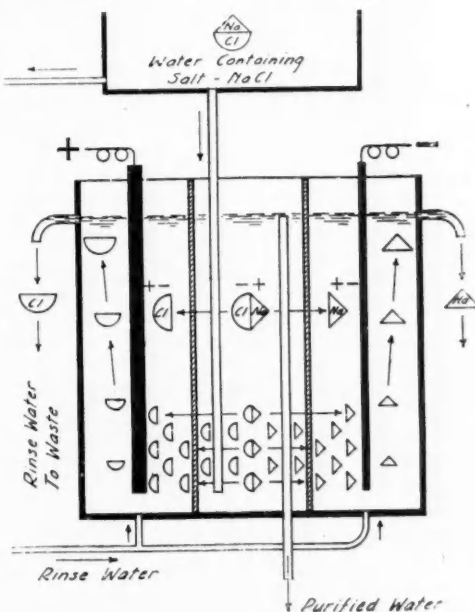


FIG. 2. PURIFICATION OF WATER CONTAINING SODIUM CHLORIDE (DIAGRAMMATIC).

These provisions are made in the cells employed in the Electro-Osmose process. The arrangement of a typical three-compartment cell is shown diagrammatically in Figure 1. It

will be seen that the water to be purified flows continuously through the middle compartment, which compartment is separated from the electrode compartments by diaphragms. In order to prevent excessive concentration of the products of electrolysis in the electrode compartments, a small flow of wash water is made to pass continuously through these compartments.

An Example of the Method

The purification of a water containing sodium chloride is shown graphically in Figure 2 (see previous page). This graphic representation is sufficiently self-explanatory to require no further comment except the statement that, for the sake of sim-

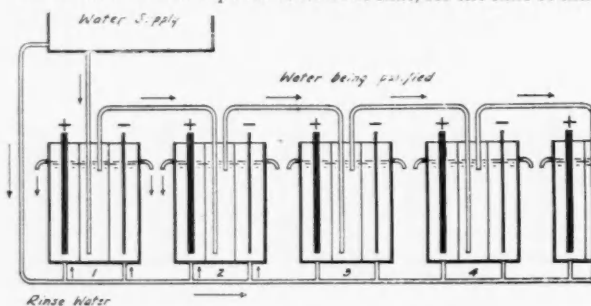


FIG. 3. A SERIES OF CELLS SUCH AS THAT SHOWN IN FIG. 2.

licity, the discharged sodium and chloride ions are shown as Na and Cl and not as the products actually formed in the electrode compartments.

In actual practice, complete purification is not accomplished in one cell, but in a series of cells, such as is shown diagrammatically in Figure 3. Here the water being purified is siphoned from the middle compartment of one cell to the middle compartment of the succeeding cell. Ordinarily ten cells are placed in series.

There are several reasons why purification is not attempted in one cell. Probably the most important consideration is based on the fact that as the water becomes purer its electrical resistance increases and successively higher voltages are necessary to effect purification. It is much more economical, however, to operate at lower voltages as long as purification can be effected at these voltages. In practice, therefore, when a water is being treated for complete removal of its dissolved solid content, the electrical hook-up is made so as to provide the lowest possible voltages consistent with the desired purification.

For example, with many waters, complete purification is carried out with a 5, 2, 2, 1 wiring—that is, the first five cells are connected in series, then the next two are connected in series, then the next two, while only the last cell carries the full line voltage. Assuming a line voltage of 110 volts, this means that the average voltage of the first five cells is about 22, that of the next four is about 55, while the last cell has 110 volts across it.

Electro-Endosmosis and Electrophoresis

When the Electro-Osmose apparatus is in operation, there is a definite and appreciable flow of water from the

middle compartment through the cathode diaphragm to the cathode. This is true electro-endosmosis.

We have observed also that, when certain slightly turbid raw waters are treated with the Electro-Osmose, the effluent water is sparklingly clear. This effect is of course due to electrophoresis, by reason of which the charged colloidal particles causing the turbidity are made to travel from the middle compartment to the electrode chambers.

Degree of Purification Possible

By means of the Electro-Osmose process, carried out in the modern equipment available, it is readily possible to reduce the salt content (and in this term is included any ionisable compound or any particle carrying, or capable of being given, an electric charge) to well within the United States Pharmacopoeia permissible maximum of 10 parts per million. For the past two years all of the "distilled water" required for our laboratory and other technical purposes has been supplied by a laboratory Electro-Osmose apparatus. The raw water, which is taken directly from Lake Michigan, has a dissolved solid content of 140 to 150 parts per million. The effluent from the Electro-Osmose unit has a total solid content of 5 to 6 parts per million. Tests we have made on other waters containing as high as 1,000 parts per million have demonstrated that purification can be accomplished satisfactorily with a maximum of 10 parts per million of dissolved solids in the purified water.

Partial Purification

To meet the pure water requirements of some industries, it is not necessary that the total dissolved solid content be reduced to the 10 parts per million specified by the United States Pharmacopoeia. By changing the wiring arrangement of the Electro-Osmose series, and by altering the rate of flow of water through the apparatus, it is possible to deliver an effluent of any desired degree of purity.

The production of partially purified water is generally considerably more economical than that of completely purified water, for the reason already pointed out that the purification may be carried out with lower voltages. A specific illustration of this may be found in the fact that to purify completely a water with an initial total solid content of 150 parts per million requires the expenditure of about 50 kilowatt hours per 1,000 gallons, while the purification of the same quantity of water from an initial dissolved solid content of 300 parts per million to a residual content of 150 parts per million—a reduction of 150 parts per million in either case—requires only about 15 kilowatt hours.

Cost of the Electro-Osmose

Within its field of usefulness, the Electro-Osmose compares very favourably with distillation, both in its installation and operating costs. This field may roughly be said to comprise waters with total solid contents up to 1,000 parts

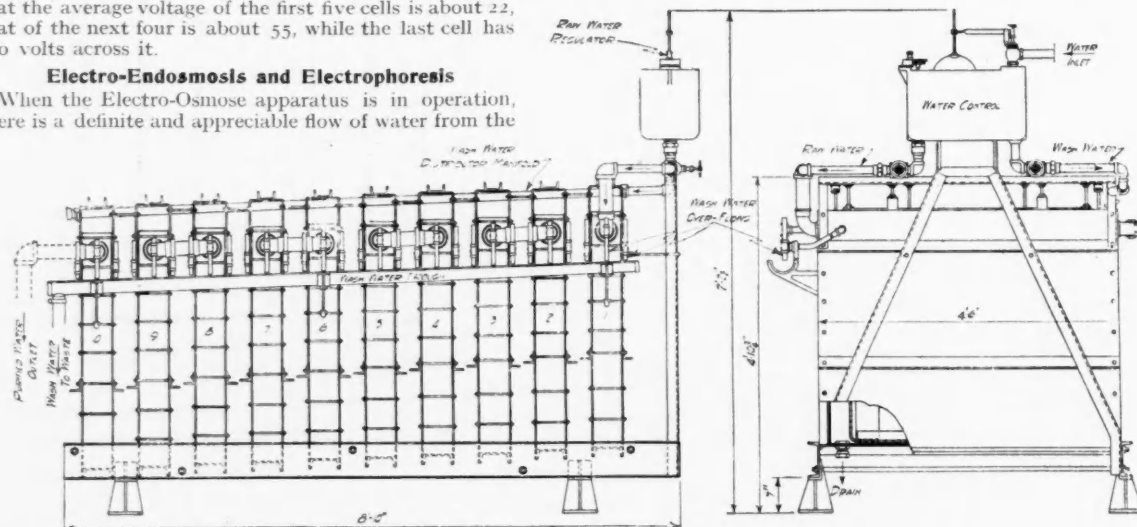


FIG. 4. ELECTRO-OSMOSE EQUIPMENT SUPPLIED FOR PLANT REQUIRING PURE WATER FOR THE MANUFACTURE OF ICE.

per million, in cases where complete purification is to be secured, with an upper limit of about 1,500 parts per million where partial purification is desired. The principal operating expense of the Electro-Osmose process is, as would be expected, the cost of the electrical energy required. With waters of relatively low initial concentrations (up to 300 or 400 parts per million), for example, the cost of the electrical energy is quite small compared to the energy required for thermal distillation. With increasing raw water concentrations, the expenditure of electrical energy is naturally greater, until, beyond the limits mentioned, the cost may be prohibitive.

The only other major item of expense with the Electro-Osmose is the rinse water for the electrode compartments. The volume of this wash water is equal roughly to that of the water being purified. Against this, in distillation, is the volume of cooling water required, which is several times that of the condensate—although the cost of the cooling water may be reduced considerably by recirculating systems employing such devices as cooling towers, spray ponds or other means for cooling the bulk of the water by the evaporation of a portion of it.

Little Attention Required

The only attention required for the Electro-Osmose apparatus is the periodic cleansing of the diaphragms. The necessity for this arises from the fact that when the calcium and magnesium ions are discharged in the cathode chamber, the products of electrolysis, together with the reaction products of these on the raw water, form a sediment, a small portion of which is deposited in the cathode diaphragm, gradually clogging it to an undesirable degree. The cleaning of the diaphragms consists in immersing them first in dilute hydrochloric acid and then in water. In practice, an extra set of diaphragms is supplied so that the change may be made quickly and the clogged diaphragms cleaned when convenient. The necessity for cleaning the diaphragms is therefore dependent on the hardness of the raw water. With the average water, the diaphragms will have to be cleaned every two or three weeks.

Pre-Treatment of the Water

Since the necessity for cleaning the diaphragms arises from the presence of calcium and magnesium compounds in the raw water, it follows that any softening process which will remove the calcium and magnesium will eliminate the necessity for the cleaning. Either the lime-soda or zeolite softening process may be employed, though the use of one or the other may be preferable in different instances. In the case of a water containing large amounts of calcium and magnesium bicarbonates, treatment with lime, as has already been pointed out, will not only remove these diaphragm-clogging substances, but in doing so will reduce correspondingly the dissolved solid content of the water and so decrease the amount of electrical energy required in the subsequent Electro-Osmose treatment. The zeolite softening process will eliminate the calcium and magnesium practically completely; but as this process simply replaces the calcium and magnesium with sodium, it is obvious that the amount of dissolved solids is not reduced in the water going to the Electro-Osmose apparatus.

The Electro-Osmose process is not a competitor of lime-soda or zeolite water softening. Where the latter processes can be employed to advantage, they are almost always very much cheaper than the Electro-Osmose, both in the initial cost of the equipment and in the operating charges.

Limitations of Electro-Osmose Purification

Since the Electro-Osmose functions primarily by electrolysis, it follows that the process will not remove substances which do not carry, or cannot be given, an electrical charge. Inert gases, typical non-electrolytes, and some colloids, particularly certain organic colloids, will therefore not be removed. Fortunately, however, these impurities are usually present in normal waters to a negligible or unobjectionable amount, or, as in the case of inert gases, their removal for most technological purposes is unimportant.

Since water completely purified by the Electro-Osmose compares favourably with distilled water, it may be employed in practically all cases where distilled water is now being utilised. In Europe, many installations are reported to be furnishing "distilled water" for the manufacture of pharma-

ceuticals, for storage batteries, for the manufacture of mirrors, and for a variety of other uses. In the United States, the first large installation is just being made in the ice industry, where a water containing an excessive amount of dissolved salts is being treated to reduce this amount to a point where good ice can be made from the treated water. The type of Electro-Osmose equipment supplied for this purpose is shown in Figure 4. Arrangements have also been made for placing on the market a recently developed laboratory type of apparatus.

Low-Temperature Carbonisation Gas

Use in Heat Treatment of Steel

AN important field for the low temperature carbonisation of coal is the iron and steel and general metallurgical industries; that is, by treating bituminous coal dust and smalls to obtain smokeless solid fuel, as well as tar and light oil, and using all the gas direct for the heat treatment of steel. At the present time the general method adopted is hot uncleaned producer gas, but there is also employed coal or other solid fuel in the lump form, pulverised coal, oil, natural gas, and coke oven gas. In this connection an interesting paper, "Fuel Used in Heat Treatment of Steel," has been read in Philadelphia by Martin J. Conway, fuel engineer to the Lukens Steel Co., of Coatesville, Pa., well known for boiler plates and flange steel, who are going to take all the gas from a "K.S.G." low-temperature carbonisation plant.

Advantages

Mr. Conway sums up the advantages of low-temperature carbonisation gas as against hot uncleaned producer gas as follows:—(1) Cleaner operating conditions without soot and deposits in the gas mains, and entire absence of ash and clinker; (2) Constant calorific value of the gas, which does not obtain with producers, especially because of the necessity of clinkering; (3) Ease of control, due to constant pressure and calorific values, thus allowing of highly efficient automatic gas supply with constant heat; (4) Flexibility in the sense that low-temperature carbonisation gas of this character can be piped with the greatest ease to any part of the plant, whereas hot dirty producer gas cannot be sent for long distances, and the supply pipes lined inside with firebrick are costly to install and keep in operation; (5) Great accuracy in the actual heat treatment of the steel in the sense that the flame can be altered instantly so as to give a slightly reducing or slightly oxidising atmosphere at will, with continuous maintenance of these conditions in a manner impossible with producer gas or oil firing; (6) Various other advantages, which include easy metering of the gas and therefore very scientific control of the furnace operation, while it is not necessary to pass the gas through regenerator chambers, so that the whole of the latter equipment can be thrown on to pre-heating the air and giving still higher combustion efficiency.

The K.S.G. Plant

It may be remembered that the "K.S.G." plant now being erected by International Combustion Engineering Corporation, adjoining the Lukens Steel Works, consists of six standard rotary cylindrical steel retorts, each with a throughput of 80 tons of coal per 24 hours, that is 480 tons for the complete plant, consisting of a very large slightly inclined steel cylinder 85 ft. long and 5 ft. 6 in. diameter, carrying an outer cylinder 72 ft. 9 in. long and 10 ft. diameter, running at one revolution in 90 seconds, driven by suitable gearing and giving $2\frac{1}{2}$ hours carbonisation with a maximum temperature of 925–1,025° F. by means of external heating along with steaming of the charge, and blending if necessary with a small amount of the smokeless fuel smalls. Obviously the future of low-temperature carbonisation, especially in Great Britain, lies in co-operation with furnace equipment, using all the gas for example in chemical plant, steam boilers, and pottery, general ceramic and glass works, as well as in the iron and steel industries.

A Platinum Substitute

AN ALLOY named "Konel," said to be in some circumstances a substitute for platinum, is being marketed by the Westinghouse Electric and Manufacturing Co. The alloy has the following composition: Nickel, 70 per cent.; cobalt, 19.5 per cent.; the rest being iron and titanium.

The Nitrogen Fixation Industry of Japan Its History and Development

Japan, as an agricultural country, finds it necessary to employ increasing quantities of fertilisers. Natural fertilisers—particularly bean-cake—are still much in use, but artificial nitrogenous fertilisers are coming more and more into use. Ammonium sulphate is peculiarly adapted for application in Japan, and farmers are favouring its use in place of bean-cake. This fact has caused the establishment and expansion of the nitrogen-fixation industry in Japan.

THE nitrogen-fixation industry in Japan originated in 1908, when a small hydro-electric plant was built at Sogi, Kyushu, for the manufacture of cyanamide under the Caro-Frank process. Actual production began in the plant in 1909, and in 1911 Mr. Fujiyama, one of the principals of this company, discovered a process less expensive than the Caro process. His invention was registered, and a new company, the Nihon Chisso Kabushiki Kaisha, was formed. The Mitsubishi interests are large holders in this concern, which has steadily developed and is now the largest single producer of ammonium sulphate in Japan, production during 1928 having reached 100,000 tons. The rights of the Casale process for nitrogen fixation were acquired by this firm, and that process is now used in their two plants at Mizumata and Nobeoka, Miyasaki Prefecture, Kyushu. This company has under construction a hydro-electric plant in Chosen, which will shortly be completed. This plant is to manufacture ammonium sulphate, the estimated annual production being 100,000 tons. Another plant, which will be located in Chosen, is also planned, and will have an annual capacity of 200,000 tons.

Operations of Various Companies

The Denki Kwagaku Kogyo Kabushiki Kaisha, Electrochemical Industries Co., in which the Mitsui interests are heavily interested, acquired in 1913 a new discovery of Mr. Fujiyama for nitrogen fixation, and are manufacturing ammonium sulphate. This company is the second largest producer of this product in Japan, and operates three mills, one in Niigata, one in Toyama Prefecture, and one in Kokuoka Prefecture. Their production during 1928 was 88,500 tons.

The Mitsui Mining Co. operates nitrogen-fixation plants, one at Hikoshima and one at Omuda, Kyushu. The Omuda plant, although only partially completed, has started production. The Claude system of nitrogen fixation is used in these plants. The production of ammonium sulphate in these plants during 1928 was 6,800 tons. The Claude patent was formerly the property of the Suzuki interests, and after their failure passed to the Bank of Taiwan, from whom the Mitsui Mining Co. bought both the patent and the plant at Hikoshima.

The Dainihon Jinzo Hiryo Kabushiki Kaisha, the largest artificial fertiliser company in Japan, has a plant in Toyama Prefecture which uses the Fauser system of nitrogen fixation. The output capacity of this plant is 30,000 tons of ammonium sulphate per year, but during 1928 it produced only 20,000 tons.

The Daido Hiryo Kabushiki Kaisha, a subsidiary company of the Daido Electric Co., use the Claude system of nitrogen fixation in their factory at Takeu, Toyama Prefecture, and produced, during 1928, 5,000 tons of ammonium sulphate. The Hokuyetsu Suiden Kabushiki Kaisha at Kambara-gun, Niigata Prefecture, operates a factory under the Claude system, and during 1928 made 6,000 tons of ammonium sulphate. The two foregoing companies use excess electricity for which they have no outlet in the production of this commodity.

Production of Ammonium Sulphate

The production of ammonium sulphate in Japan during 1928 was as follows:—

| | Long Tons |
|---|----------------|
| Nihon Chisso Hiryo K. K. | 100,000 |
| Denki Kwagaku Kogyo K. K. | 88,500 |
| Mitsui Mining Co. | 6,800 |
| Dai Nihon Jinzo Hiryo K. K. | 20,000 |
| Daido Hiryo K. K. | 5,000 |
| Yawata Steel Works (B.) | 13,000 |
| Hokuyetsu Suiden Kaisha | 6,000 |
| Nihon Seikojo (Steel Works) (B.) | 2,300 |
| Kamaishi Mining Co. (B.) | 1,200 |
| Kenjiho Mining Co. (Mitsubishi) (B.) | 1,500 |
| South Manchuria R. Co. (B.) | 11,000 |
| Shinetsu Chisso Hiryo Co. | 6,000 |
| Hokuriku Denki Kogyo Co. | 5,000 |
| Gas manufacturing companies. | 4,500 |
| Total | 270,800 |

Many of the companies listed have equipment which would allow a much larger production of ammonium sulphate, but for economic reasons these plants are not producing at full capacity. The companies named (B) are producing by-product sulphate.

Production Increasing

Considering the capacity of plants already in operation and the new plants under construction, it appears that Japan is slowly approaching the time when domestic production of ammonium sulphate will be sufficient to meet the demand. During 1928 the total production was 270,800 tons. Possible production for 1929 approaches 400,000 tons, and it seems certain that by 1930-31 production will be greater than 400,000 tons, with a possibility of 450,000 tons. The yearly demand is slightly in excess of 600,000 tons at present, and with the lower prices that are promised the demand should also increase. In fact, it is reported that this increase in demand for ammonium sulphate in preference to bean-cake is already under way.

During the first four months of 1929 the importation of bean-cake into Japan declined 79,870 tons from the figure for the same period of 1928, and the imports of ammonium sulphate show a gain of 41,596 tons over the 1928 figures. It does not appear that Japan can produce sufficient ammonium sulphate to meet the demand for at least five years to come, particularly because some of the plants which are to have the greatest capacity will not be producing to capacity for two to three years.

Imports of Ammonium Sulphate

Japan at present, however, is still far from self-supporting in the manufacture of ammonium sulphate, and is one of the world's largest consumers of this product. During the early post-war period the United States was the principal supplier of this market, but with the gradual recovery of industry in European countries trade was lost to England and Germany, the foremost competitors. Japan is still the second largest outlet for United States exports of ammonium sulphate.

Imports of ammonium sulphate into Japan during 1926 were 4,687,236 piculs (276,778 tons), valued at 42,933,398 yen. Figures in detail for 1927 and 1928 follow:—

IMPORTS OF AMMONIUM SULPHATE INTO JAPAN.

| Country of origin | 1927 | | 1928 | |
|---------------------|-----------------|------------|-----------------|------------|
| | Quantity Piculs | Value Yen | Quantity Piculs | Value Yen |
| Kwantung Province | 39,437 | 313,748 | 19,927 | 155,304 |
| Great Britain | 805,540 | 7,285,303 | 1,458,828 | 11,442,432 |
| Germany | 2,126,748 | 16,759,252 | 2,406,842 | 18,290,592 |
| United States | 661,682 | 5,042,991 | 465,135 | 3,415,380 |
| Australia | 61,072 | 457,622 | 10,161 | 77,020 |
| Other countries ... | 90,946 | 720,277 | 103,932 | 843,796 |

Total 3,875,425 30,579,253 4,464,825 34,224,524
The Japanese picul equals 132.3 lb. Total imports for 1927 were equivalent to 228,841 tons, and for 1928 to 263,645 tons.

New plants are being established where electric power can be obtained at much lower prices.

New Plants Proposed

The Sumitomo Artificial Fertiliser Co. has under construction a plant at Niihama, Ehime Prefecture, which will be completed in April, 1930. This will have an annual output of 30,000 tons of ammonium sulphate.

The Showa Hiryo Kabushiki Kaisha (The Showa Artificial Fertiliser Co.) was organised in October, 1928, by the Tokyo Electric Light Co., the Toshih Electric Co., the Niigata Electric, and the Niigata Hydroelectric companies, with a capital of 10,000,000 yen. This company plans to produce cyanamide and ammonium sulphate, obtaining the electric current necessary at a very low price from the companies who are interested. There is at present under construction a factory at Shikanose, Niigata Prefecture, which will have an annual output of 100,000 tons. It was originally planned to use the Uhde system

of nitrogen fixation, and a deposit of 150,000 yen had already been paid to the owners of that patent. It was later decided, however, to use the Shibata process, which is the property of the Japanese Government, forfeiting the deposit, since cost of production per ton, using the Shibata process, is said to be only 60 yen. It is not anticipated that production for the first year will exceed 50,000 tons.

The Toyo Chisso Kogyo was formed in 1926 by the Mitsubishi, Mitsui, Sumitomo, Japan Artificial Fertiliser, and Sankyo Drug Companies for the purpose of manufacturing nitrogeous fertilisers under the Haber process. The company paid 10,000 yen to the Japanese Government, which had received the patent rights from Germany as part of the German reparation payments, for the patent rights. This company has never started to manufacture, but has collected a royalty of 2 per cent. on all German imports manufactured under this system, and, with a paid up capital of 250,000 yen, took in as royalties during 1927 and 1928 the sum of 667,000 yen. Due to the fact that this company had never manufactured under the Haber rights, the Government has requested the return to the Government, without indemnity, of the patent rights. There are several companies which desire the patent rights on the Haber system, but it is said that the Showa Fertiliser Co. will probably be granted them in place of the Shibata patent.

Safety Campaign in Chile

Prizes for Nitrate Plant Managers and Workers

A "SAFETY" competition was inaugurated by the Nitrate Producers' Association of Chile at the beginning of this year, with cash prizes ranging in value from 6,000 to 25,000 Chilean pesos, in an effort to reduce the number of industrial accidents in nitrate plants. The contest is for the period of 1929, and only those nitrate plants which have been operating throughout the 12 months will be eligible.

In making computations for the purpose of establishing the relative order of merit of the plants, the frequency or severity of the accidents will be given special attention on the basis of the number of working days lost out of every 1,000 worked by each plant. Accidents which cause only temporary disability will be computed on the basis of the number of working days lost by the injured worker, as shown by the statistics of the plant, while fatal accidents and those resulting in permanent total disability will be computed as a loss of 6,000 working days. Those which cause permanent partial disability will be computed in proportion to the percentage of compensation granted, on a basis of a total of 6,000 working days lost.

The following prizes are to be given: To the plant securing first place, a gold medal for the manager and the sum of 25,000 pesos to be distributed among the heads, foremen, and employees having the largest share in winning the prize. The Association will also award a trophy which will remain in the possession of the plant winning it for one year and will become the permanent property of any plant winning it twice in succession or three years not in succession. A silver medal to be given to the manager and 12,000 pesos, to be distributed as above, will be given to the plant holding the second place, while the third prize will consist of a silver medal and 6,000 pesos.

Swedish Electrochemical Industry

ONE of the chief products of the Swedish electrochemical industry is calcium carbide. Production during 1925 and 1926 averaged 43,300 tons annually. In 1927, output fell to 32,173 metric tons, of which 12,650 tons were exported. An important share of the domestic consumption is utilised in the manufacture of cyanamide. The output of cyanamide in 1927 was 24,473 tons, of which 9,120 tons were exported. Exports of Swedish chlorates and perchlorates of potash and soda increased from 2,000 tons in 1924 to 5,100 tons in 1928. Production in 1924 was 2,500 tons, and in 1927, the latest year for which production data are available, 8,350 tons. The electrolytic production of caustic potash and soda is small, the combined output of both products in 1927 being slightly less than 5,000 tons. Bleaching powder production is insufficient for the domestic requirements. Production in 1927 was 10,300 tons, and imports 8,430 tons. In 1928 imports rose to 9,700 tons.

The Sources of Cadmium

Survey by U.S. Bureau of Mines

In a recent circular, the United States Bureau of Mines, Department of Commerce, discusses the available sources of cadmium. Apparently the only commercial source is zinc minerals. Greenockite, otavite (a basic carbonate), pritzbramite (a reddish zinc blende containing up to 5 per cent. of cadmium), and a few other cadmium minerals are, however, recognised. Most zinc ores contain cadmium in minute quantity, and the cadmium of commerce has all come from the following sources: Zinc ores treated by fractional distillation; bag-house fume from lead smelters treating zinciferous ores; and residues from the purification of zinc solutions at electrolytic zinc or lithopone plants.

Silesian Production

In Silesia, cadmium is strictly a by-product of zinc smelting. Being concentrated in a brownish smoke which appears at the beginning of the distillation, it was formerly caught mainly in the "prolongs." Prolongs, which are essentially second condensers, are not employed in the United States because the small amount of zinc that escapes the adapter or first condenser does not pay for the additional labour involved. Even in Silesia prolongs have been discontinued except at works that make a speciality of zinc dust (blue powder). Usually, however, special arrangements are made for burning the vapour from the retorts and leading the fume to a central chamber.

Blue powder containing 4 and up to 8 per cent. of cadmium has been the main source of cadmium in Europe. This powder, and likewise the cadmium-bearing fumes, are mixed with carbon and treated by repeated distillation for the recovery of their zinc and cadmium.

Wet Methods

In the United States, wet methods are used for the recovery of cadmium from flue dusts as well as from the other residues of zinc, lead, or copper production. At some stage in these various processes a purified sulphate (rarely a chloride) solution is obtained which contains essentially zinc and cadmium (and thallium). By one process the cadmium from these solutions is precipitated by zinc dust, this precipitate being redissolved in acid and electrolysed. Aluminium cathodes are used, and the deposited cadmium is periodically stripped, melted, and cast into sticks. This general process is in use at several American plants and at the electrolytic zinc plants at Trail, British Columbia, and Risdon, Tasmania. According to the other process, the cadmium is precipitated from solution in the form of a sponge by means of zinc slabs or plates. This sponge is then distilled and the condensed cadmium is remelted and cast into sticks.

Fumes from brass works have been considered as potential sources of cadmium. Brass made from slab zinc containing as much as 0.5 per cent. of cadmium has been found to contain scarcely a trace of cadmium, because that element, being even more volatile than the zinc, is almost wholly volatilised when added to the molten copper. More than 10 years ago, the U.S. Bureau of Mines estimated that 400 lb. of cadmium was lost daily at Waterbury, Conn., but now purer zinc is being used, and the quantity of cadmium that escapes in this way is probably less than formerly. In any event, even when prices of cadmium were two or three times higher than they are now, it was not considered economical to try to recover this metal.

New Explosives Plant for Manitoba

CANADIAN EXPLOSIVES LTD., a division of Canadian Industries, Ltd., of Montreal, has decided, after more than a year of consideration, to build a plant in Manitoba, chiefly for the purpose of supplying explosives to the mining companies operating in Northern Manitoba and Saskatchewan and North-western Ontario. A plot of 1,000 acres has been purchased at East Selkirk, just north of Winnipeg, and it is understood that a plant will be erected next spring at a cost of around \$750,000. It is planned to have the plant completed and producing before the end of 1930, at which time the two largest Northern Manitoba mines, the Flin Flon and Sherritt Gordon, are expected to be ready for operation.

United Molasses Co.'s Development

A Remarkable Record

IN view of the great expansion of the business of the United Molasses Co., Ltd., during the last six months, the chairman has issued a short report of the developments which have taken place since the annual meeting in April. In this period the company has purchased the entire share capital of the Kentucky Alcohol Corporation, New York, the Westwego Molasses Co., New York, and the Solox Car Line Corporation, New York; 75 per cent. of the capital of the Old Time Molasses Co., Havana; and 50 per cent. of that of the Eastern Alcohol Corporation, Deepwater, Delaware. During the summer the company acquired the entire minority shareholdings of C. U. Snyder and Co., Inc., Chicago, the Dunbar Molasses Corporation, New York, and the Old Time Molasses Co., Havana, so that it now owns the entire share capital of all its subsidiary and associated companies with the exception of the Eastern Alcohol Co., Delaware, of which it owns 50 per cent., the other 50 per cent. being owned by Du Pont de Nemours and Co.

With a view to extending its participation in the Central European molasses markets the company has recently purchased the old-established sugar and molasses business of Karl Flammerschein Sohn at Prague and Danzig. To enable the company to handle the production of molasses in the Hawaiian Islands, which it has purchased for a term of years, commencing December next, it has formed the Pacific Molasses Co., Ltd., and taken over a large tank installation at San Francisco. To develop the Canadian market there has been formed the Canada West Indies Molasses Co., Montreal, where a new tank installation is nearing completion.

Important China Clay Developments

New Acquisitions by English China Clays, Ltd.

IN pursuance of the policy for a closer unification of the industry, English China Clays, Ltd., have completed negotiations for the acquisition of important works which will add to the capacity of English China Clays, Ltd., another 50,000 tons per annum. The amalgamating companies are the Wheel Retallack and the Wheel Bennallack, hitherto associated with Varcoes China Clays, Ltd., the Burthly China Clay Co., the Burthly Mica Works, the New Halwyn China Clay Co., the Carbis China Clay and Brick Co., and the Trethowal China Clay Co.

Improved prospects are reported in the China Clay industry. The shipping statistics for August are as follow:—Fowey, 62,030 tons China Clay, 4,433 tons China Stone, 2,321 tons Ball Clay, total, 68,784 tons; Par, 5,028 tons China Clay, 770 tons China Stone; Charlestown, 3,771 tons China Clay; Plymouth, 1,779 tons China Clay; Penzance, 993 tons China Clay; Looe, 387 tons China Clay; Falmouth, 175 tons China Clay. Conveyed by rail throughout to inland destinations were 4,568 tons, making an aggregate tonnage of 86,255, compared with 75,757 in July.

Annual Conference of Institute of Fuel

THE annual two days' conference of the Institute of Fuel will be held at the Institution of Mechanical Engineers, Storey's Gate, Westminster, London, on Thursday and Friday, October 24 and 25. On the first day at 11 a.m., Sir David Milne-Watson's presidential address will be given. At 2 p.m. four papers will be presented, all dealing with the subject of "Pulverised Fuel for Marine-type Boilers," by C. J. Jefferson, chief engineer, Fuel Conservation Section of the United States Shipping Board; Admiral W. M. Whayman, of the Marine Department, Babcock and Wilcox, Ltd.; Harold E. Yarrow, of Yarrow and Co., Ltd.; and Dr. G. E. K. Blythe, chief engineer of the Buell Combustion Co., Ltd. The presentation of these papers will be followed by a discussion in which visitors as well as members are invited to take part. The annual dinner and dance will take place in the evening. On the Friday the morning session will be devoted to "Gas," when the members will assemble at the Institution of Mechanical Engineers at 10.15 a.m. under the chairmanship of Sir Arthur Duckham.

Beet Sugar Industry

Profits Made by All Companies

EACH of the fifteen companies manufacturing sugar or molasses from home-grown beet, and operating under the British Sugar (Subsidy) Act, made a profit during the last financial year. Their gains ranged from £803 of the Yorkshire Sugar Co., Ltd. (Selby factory), to the £100,000 of the English Beet Sugar Corporation, Ltd. (Cantley factory). The profits of the other concerns, as given in the annual return issued by the Ministry of Agriculture, were as follows:—

| | |
|--|---------|
| Home-Grown Sugar, Ltd. (Kelham) | £ 3,125 |
| Ely Factory, Ltd. | 56,250 |
| Ipswich Factory, Ltd. | 50,000 |
| King's Lynn Factory, Ltd. | 36,000 |
| Anglo-Scottish Beet Corporation (Colwick and Spalding) | 97,816 |
| West Midland Co., Ltd. (Kidderminster) | 69,565 |
| Second Anglo-Scottish Corporation (Poppleton, Felstead, and Cupar) | 18,528 |
| United Sugar Ltd. (Bury St. Edmunds) | 93,271 |
| British Sugar Manufacturers, Ltd. (Wissington) | 27,644 |
| Central Sugar, Ltd. (Peterborough) | 43,603 |
| Shropshire Co., Ltd. (Allscott) | 48,138 |
| Lincolnshire Co., Ltd. (Bardney) | 11,283 |
| Second Lincolnshire Co., Ltd. (Brigg) | 6,765 |

Several of the companies have used their profits to meet depreciation, while others have strengthened their reserves.

The balance sheet of Sugar Beet and Crop Driers, Ltd., which has an experimental station at Eynsham, shows neither profit nor loss. Among the assets appears a sum of £249,468 for patents, patent rights and cost of research.

American Chemical Bibliographies

THE U.S.A. National Research Council announces the publication of its Bulletin No. 71, which is the first supplement to the Bibliography of Bibliographies on Chemistry and Chemical Technology, covering principally the period 1924-1928, Bulletin No. 50 having covered the period 1900-1924. This supplement contains approximately 4,100 bibliographies classified under 1,050 headings.

As the title indicates, the work is a compilation of bibliographies published separately or at the end of books or magazine articles, or as footnotes to the same, on the numerous aspects of pure and applied chemistry. Each entry gives name of author or compiler, title, and place of publication. The majority of the entries state the number of references, thus giving an indication of the completeness of the particular bibliography. The entries are classified under the proper subject-headings, alphabetically arranged. The duplication of individual entries has been largely avoided by the liberal use of cross references. As an example of the value of this compilation, the following information is given regarding the number of bibliographies reported in Bulletin 71 for some of the more important topics:—Blood chemistry 25, cement 21, coal 31, colloids 55, dielectrics 24, dyes and dyeing 27, fertilizers 38, fibres 26, foods 33, iron and steel 76, metabolism 77, milk 43, mineral resources 25, paper 39, petroleum 54, photography 36, plant chemistry 41, rubber 55, vitamins 25, water 45.

Copies of Bulletin No. 71 may be obtained from the publication office, National Research Council, B and 21st Streets, N.W., Washington, D.C., for \$1.50 a copy.

Chemical Forces and Atomic Structure

A COURSE or three lectures, under the above title, will be given at University College, Gower Street, London, by Professor K. Fajans, professor of physical chemistry in the University of Munich, at 5.30 p.m., on Monday, Wednesday and Friday, October 14, 16 and 18. The three lectures, which will be delivered in English, will deal respectively with the two main types of chemical linkage and the fundamental properties of ions; transition types of chemical linkage and the deformation of ions; and photochemical and analytical applications of ion-adsorption on crystals. At the first lecture the chair will be taken by Professor F. G. Donnan, F.R.S. Admission is free, without ticket, to all who are interested.

From Week to Week

MR. FRANK HODGES has resigned from the "L. and N." Coal Distillation Co. and its allied companies.

PROFESSOR W. A. BONE, F.R.S., of the Imperial College, has joined the research council of Imperial Chemical Industries, Ltd.

THE RADIUM COMMISSION has established offices at 5, Adelphi Terrace, Strand, London, and any communications should be addressed to the secretary.

NORMAN HOPE AND PARTNERS, of 61, Wind Street, Swansea, have been appointed by James Gordon and Co., Ltd., of Windsor House, Kingsway, London, W.C., as their representatives in South Wales.

A VERDICT of "Suicide whilst of unsound mind" was returned at an inquest on Thursday, September 26, at Rotherham, on Cecil Kennedy, a metallurgical chemist. The evidence showed that he had taken potassium cyanide.

THE PROGRAMME OF WORK at the Sir John Cass Technical Institute, Aldgate, London, for the present session, includes a considerable extension of the course of lectures on "Coal Carbonisation," and the addition of courses of lectures on "The Application of X-ray Analysis to Chemical Problems" and "Micro-Chemical Analysis" respectively.

THE SANTIAGO NITRATE CO. announce that their property has now been transferred to the Liverpool Nitrate Co. under the terms of the agreement dated May 17 last. The purchase consideration of £35,250 has been received and the directors have decided to convene meetings, to be held on October 9 and 24, for the liquidation of the company.

THE BULMER RAYON CO., LTD., held its fourth annual meeting on Friday, September 27, at the Cannon Street Hotel, London. After some discussion it was decided that the meeting should be adjourned until some future date to be within twenty-one days after the annual meeting of the British Acetate Silk Corporation, shares in which are the principal asset of the Bulmer Rayon Co.

THE INSTITUTE OF METALS announces that so great has been the demand for copies of the nineteenth May Lecture, delivered this year by Sir Oliver Lodge, on "States of Mind which Make and Miss Discoveries: With Some Ideas about Metals," that it has been reprinted in pamphlet form (pp. 32, 5s.). Copies may be obtained from the Institute of Metals, 36, Victoria Street, London, S.W.1.

PROFESSOR WILLIAM MCPHERSON, dean of the department of chemistry of the Ohio State University, has been chosen president-elect of the American Chemical Society. Circumstances arose which made it imperative for Doctor S. W. Parr to be relieved of some of his activities, and as a consequence he tendered his resignation as president-elect of the Society. Accordingly, as provided for in the Constitution, the office was filled from the other names on the ballot sent to the Council last November.

THE CHEMICAL ENGINEERING GROUP of the Society of Chemical Industry will hold its opening meeting for the new session on Friday, October 11, in the rooms of the Chemical Society, Burlington House, Piccadilly, London. The chairman of the Group, Mr. H. Talbot, will take the chair at 8 p.m., when a paper on "Rationalisation—Its Meaning and Application, with Special Reference to the Chemical Industry," will be read by Mr. J. Davidson Pratt, general manager of the Association of British Chemical Manufacturers.

THE WORSHIPFUL COMPANY OF GOLDSMITHS, in order to mark the close association between the Company and the Metallurgical Department of the University of Cambridge, and in recognition of the distinguished work carried out by Mr. C. T. Heycock during his tenure of the Goldsmiths' Readership in Metallurgy, have signified their intention to provide a yearly sum of £500 when a new reader is appointed and until such time as it may be convenient to them to transfer a capital sum of £10,000 to increase the endowment of the office.

PROFESSOR F. G. DONNAN, F.R.S., delivered a public lecture, entitled "The Application of Physical Chemistry to Chemical Industry, with Special Reference to Catalysis," at Princeton University on Thursday, September 26, on the occasion of the formal opening of the new chemical laboratory of the University. On Friday and Saturday, September 27 and 28, a symposium on "Catalysis and the Mechanism of Catalytic Reactions" was held, in which a number of foreign chemists took part, including Mr. C. H. Hinshelwood, F.R.S. (Cambridge), Professors M. Bodenstein and M. Polanyi (Germany), and Professor F. Perrin (France).

THE BRITISH SCIENCE GUILD announces that its Norman Lockyer Lecture will be delivered on Tuesday, November 19, at 4.30 p.m., by Sir Walter Morley Fletcher, who will speak on certain aspects of medical research and their applications, at the Goldsmiths' Company's Hall in Foster Lane, London. The Alexander Pedler Lecture, established by the Guild in memory of Sir Alexander Pedler, who was for many years honorary secretary, will be given by Dr. G. C. Simpson, on "Past Climates." It will take place under the auspices of the Manchester Literary and Philosophical Society, 36, George Street, Manchester, on Tuesday, November 26, at 5.30 p.m.

PRINCE GEORGE will open the completed buildings of Hull University College on the morning of Thursday, October 10.

MR. R. S. BRIEANT has recently been appointed on the propaganda staff of the Chilean Nitrate Committee, and will take charge of the East Midland Counties.

MR. H. J. G. RUDMAN, head of the firm of Rudman and Sons, Cambrian Colour Works, is to be nominated for the post of Sheriff of Bristol for the ensuing year.

THE NEATH ABBEY PATENT FUEL WORKS, Skewen, Glam., have been purchased by the Patent Coal Carbonising Trust, Ltd., London, and will shortly recommence operations. The works have been closed down for nearly three years.

NEARLY A MILLION SHARES in Imperial Chemical Industries, distributed over the various classes, are held by employees of the company as a result of its share investment scheme, apart from those which may have been purchased privately.

SIR ROBERT HADFIELD, F.R.S., the metallurgist, was unable, owing to an injury to his leg, to be present at Manchester College of Technology on Saturday, September 28, on the occasion of the annual associateship presentation ceremony. The degree was conferred upon him in his absence.

THE EMPIRE MARKETING BOARD has approved a grant of £2,250 capital, together with an annual maintenance allowance of £3,750 for two years and £3,000 for the third, fourth, and fifth years, to the Linen Industry Research Association, for investigation into certain problems of the flax industry. Additional funds are to be supplied by the Government of Northern Ireland.

RECENT WILLS INCLUDE:—Mr. Edward Alfred Webb, of The Porch House, High Street, East Grinstead, late deputy chairman of Evans, Sons, Lescher, and Webb, Ltd., manufacturing chemists, who died on July 23, aged 78 (net personalty £14,428), £14,545.—Dr. Andrew McMillan, for some years a member of the chemistry staff of Glasgow University, and latterly lecturer in analytical chemistry, £6,226.

THE ANNUAL PRODUCTION OF LAMPBLACK in France is about 40,000 to 50,000 metric quintals (quintal=220.5 lb.). The three largest producers are Compagnie Parisienne des Noirs de Fumée, La Courneuve; Société du Gaz de Paris, Lyon; and Société Française de Noir de Fumée, Vandœuvre, près de Nancy. Imports and exports of the commodity in 1928 were, respectively, 78,715 metric quintals, valued at 35,446,000 francs, and 10,293 metric quintals, having a value of 2,542,000 francs.

ACTIVATED CARBON PRODUCTION in France varies between 10,000 and 15,000 metric quintals per year (1 metric quintal=220.5 lb.). Imports originate for the most part in the Netherlands and Hungary. The total French consumption is estimated to be between 2,000 and 3,000 metric tons a year. A special type of activated carbon is produced by the Urbain method. The current price of the quality used in gas masks is about 42 francs per kilo. Orders for delivery in 1929 are said to have been received from the Governments of Great Britain, Belgium and Italy, each order covering an amount of 20 tons.

JAPANESE PRODUCTION OF CAUSTIC SODA is only about one-third of the annual requirements of about 87,500 tons. Its quality is not satisfactory for use in the rayon industry, which is expanding rapidly. Liquid chlorine, which is produced as a by-product of electrolytic caustic soda, is used for the manufacture of bleaching powder under the "Nelson" or "Nekano" process. The Asahi Electric Industry Co., Toyama, and the Dai Nihon Artificial Fertiliser Co., whose office is in Tokyo, are the principal caustic soda producers. There are three other smaller companies. Great Britain supplies over half the caustic soda imports and the United States about one-third.

A REPORT entitled "Bureau of Mines Experimental Oil Shale Plant, Construction and Operation," has recently been prepared by engineers of the United States Bureau of Mines, Department of Commerce. The engineers concerned are Martin J. Gavin, formerly of the San Francisco Office of the Bureau, and J. S. Desmond, of the Bartlesville, Oklahoma, Experiment Station, and the report covers in detail the design of the original plant constructed at Rifle, Colorado, and the various methods used in operating it for about two years. It also covers the refining studies made on the oils produced at the plant during 1926 and 1927. Oils produced at the plant were supplied to various refining companies in the United States and to Scottish Oil Shales, Ltd., which controls the oil shale industry in Scotland. The reports of these co-operating companies are included in the bulletin. This bulletin will soon appear in print and should be of interest to operators who in the future may contemplate the design and erection of oil shale plants.

Obituary

DR. W. G. KUMMER, acting president of the American Bemberg and American Glanzstoff Corporations (manufacturers of rayon), at Elizabethtown, Tennessee. He was a native of Barmen, Germany, and became directing head of the two plants at Elizabethtown a few weeks ago.

References to Current Literature

British

ANALYSIS.—A volumetric method for determining silver in the presence of halides and cyanides. H. Baines. *Journ. Chem. Soc.*, September, pp. 2037-2041.

The micro-estimation of selenium and tellurium in organic compounds. H. D. K. Drew and C. R. Porter. *Journ. Chem. Soc.*, September, pp. 2091-2095.

GENERAL.—The equilibrium $\text{CO}_2 + \text{C} \rightleftharpoons 2\text{CO}$. F. J. Dent and J. W. Cobb. *Journ. Chem. Soc.*, September, pp. 1903-1912.

The reaction between ferric oxide and hydrogen sulphide at temperatures between 120° C. and 830° C. L. A. Sayce. *Journ. Chem. Soc.*, September, pp. 2002-2006.

ORGANIC.—Investigations of the lower olefinic acids. I.—*n*-Hexenoic acids. E. N. Eccott and R. D. Linstead. *Journ. Chem. Soc.*, September, pp. 2153-2165.

WOOL.—Some physical characteristics of greasy and non-greasy fleece wools. C. G. Winson. *Journal Textile Inst.*, September, pp. T219-232.

United States

ANALYSIS.—A manometric method for the determination of gas in fermentations. A. L. Raymond. *Journ. Biol. Chem.*, September, pp. 611-618.

APPARATUS.—An improved form of the quinhydrone electrode. G. E. Cullen. *Journ. Biol. Chem.*, September, pp. 535-538.

BOILER PRACTICE.—Chemical proportioning of internal feed water treatment. E. M. Partridge. *Ind. Eng. Chem.*, September, pp. 819-821. Operating results are given to show that harmful scale formation may be prevented at low cost through the use of organic matter in conjunction with quantities of inorganic chemicals far below the quantities necessary to react chemically with the scale-forming constituents of the feed water. A means for conveniently applying the treatment is described.

Zeolite-deconcentrator combination for boiler water purification. E. W. Scarritt. *Ind. Eng. Chem.*, September, pp. 821-823.

Some examples and precepts of water conditioning. R. E. Hall. *Ind. Eng. Chem.*, September, pp. 824-829.

Mechanism of formation of calcium sulphate boiler scale. E. P. Partridge and A. H. White. *Ind. Eng. Chem.*, September, pp. 834-838. The early stages of calcium sulphate scale formation on a heated surface have been observed in an experimental apparatus utilising the principle of the metallographic microscope. It has been observed that bubbles of dissolved gas or steam formed on a heating surface in contact with a saturated solution of calcium sulphate cause the deposition of crystals at the solid-liquid-vapour interfaces formed by the surface, the solution, and the bubbles. A new theory of boiler scale formation is presented.

ORGANIC.—Synthetic hexosephosphates and their phenylhydrazine derivatives. A. L. Raymond and P. A. Levene. *Journ. Biol. Chem.*, September, pp. 619-630.

SUGAR.—An investigation of cane-molasses distillery slop, with special reference to certain organic acids. E. K. Nelson and C. A. Greenleaf. *Ind. Eng. Chem.*, September 1, pp. 857-859. Considerable quantities of formic, acetic, succinic, tricarballic and lactic acids, a small quantity of aconitic acid, and a possible trace of citric acid were found. Glycerol was also identified.

VITAMINS.—Vitamins in canned foods. VIII.—Home canning and commercial canning contrasted in their effect on the vitamin value of pears. M. H. Kramer, W. H. Eddy, and E. F. Kohman. *Ind. Eng. Chem.*, September 1, pp. 859-861. In contrast to results reported with home canned pears, in which the vitamin C was almost entirely destroyed by the open kettle method, the commercial canning of pears leads to no apparent loss of vitamin C provided the oxygen is removed by a suitable procedure.

German

ACETYLENE.—Dissolved acetylene. I and II. W. Rimarski. *Chemiker-Zeitung*, September 18, pp. 725-727; September 29, pp. 746-748.

Fire and explosion risks of acetylene. W. Rimarski. *Zeitschrift angewandte Chem.*, September 21, pp. 933-936.

ANALYSIS.—The determination of small quantities of iodine. J. Schwarbold. *Zeitschrift analytische Chem.*, Vol. 78, Parts 5-6, pp. 161-180.

The determination of the hydroxide and carbonate content of liquors. J. Lindner. *Zeitschrift analytische Chem.*, Vol. 78, Parts 5-6, pp. 188-198.

A method for the separation of lead and bismuth. H. Blumenthal. *Zeitschrift analytische Chem.*, Vol. 78, Parts 5-6, pp. 206-213. If a solution containing lead and bismuth, slightly acidified with nitric acid, is boiled with freshly-precipitated mercuric oxide, the bismuth separates as basic nitrate.

APPARATUS.—The hydrosulphometer. R. Feibelmann and W. Meves. *Chemiker-Zeitung*, September 25, p. 749. An instrument which is used for the determination of hydrosulphites, and gives results sufficiently accurate for technical purposes.

A device for the determination of carbon dioxide in waters supersaturated with the latter. *Chemiker-Zeitung*, September 25, p. 749.

CHEMICAL ENGINEERING.—Increasing the boiler efficiency and boiler output in sugar factories. E. Praetorius. *Chemiker-Zeitung*, September 25, pp. 745-746.

COLLOIDS.—The application of plane membranes, instead of collodion bags, in dialysis and for the determination of the osmotic pressure of colloidal solutions. J. Zakowski. *Chemische Fabrik*, September 25, pp. 427-429.

GENERAL.—The preservative power, chemical detection, and pharmacology of the esters of *p*-hydroxybenzoic acid. T. Sabalschka. *Zeitschrift angewandte Chem.*, September 21, pp. 936-939.

Clays used as a source of bleaching earths. O. Eckart. *Zeitschrift angewandte Chem.*, September 21, pp. 939-941.

The dangers of sewer gas in chemical factories. Recognition and measurement of the gas. A. Ringel. *Chemische Fabrik*, September 18, pp. 415-417; September 25, pp. 429-430.

Ultramarine. J. Hoffmann. *Zeitschrift anorganische Chem.*, Vol. 183, Parts 1-2, pp. 37-76.

The decomposition of thiosulphuric acid. J. Scheffer and F. Böhm. *Zeitschrift anorganische Chem.*, Vol. 183, Parts 5-6, pp. 151-188.

The size of gas-bubbles in liquids. R. Schnurmann. *Zeitschrift physikalische Chem. A*, Vol. 143, pp. 456-474. The size of bubbles which are forced through a filter in a liquid depends on the nature of the liquid, and is independent of the nature of the filter. The viscosity of the liquid has an important bearing on the size of the bubbles; and in electrolytes the electrostatic interaction of the charged bubbles.

Miscellaneous

ANALYSIS.—The determination of manganese and of iron by successive titration with permanganate. J. Teletoff and Andronikoff. *Bulletin Soc. Chimique France*, July, pp. 674-677 (in French).

The quantitative analysis of gallium. III.—A. Brukl. *Monatshefte*, Vol. 52, Part 4, pp. 253-259 (in German). The separation of gallium for titanium, zirconium, thorium, vanadium, molybdenum, tungsten, and the rare earths.

DYE-STUFF ANALYSIS.—The fluorescence of dyestuffs in Wood's light, and its application to their identification. A. Seyewetz and J. Blanc. *Bulletin Soc. Chimique France*, July, pp. 611-616 (in French). In Wood's light (light from a mercury vapour lamp filtered through a nickel oxide glass) dyestuffs, like other organic substances, fluoresce. The fluorescence does not permit of application as an exact method of analysis, but is of use qualitatively. The different fluorescences exhibited by the same dyestuff on different fibres serve for differentiation between various fibres, e.g., natural silk, cellulose acetate, and viscose.

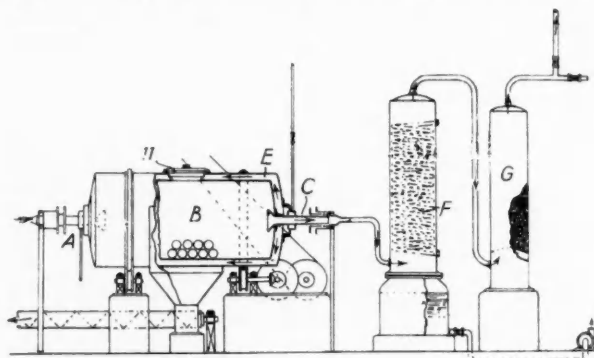
Patent Literature

The following information is prepared from published Patent Specifications and from the Illustrated Official Journal (Patents) by permission of the Controller to H.M. Stationery Office. Printed copies of full Patent Specifications accepted may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at 1s. each.

Abstracts of Complete Specifications

317,716. CHLORIDE OF LIME, MANUFACTURE OF. A. Carughi and C. Paoloni, 27b, Via Milano, Brescia, Italy. Application date, May 15, 1928.

Chloride of lime containing more than 40 per cent. of available chlorine and free from occluded chlorine is obtained by chlorinating slaked lime suspended and ground in carbon



317,716

tetrachloride. If the reaction temperature is kept above 40° C., the product is obtained in an amorphous form, but if at the end of the reaction the temperature is suddenly reduced below 20° C., the product is obtained in crystalline form which dissolves more readily in water and is more stable.

Slaked lime and carbon tetrachloride in the ratio of 1 : 3 or 4 are supplied through an opening 11 into a ball mill B which is kept at 40°-60° C. by a hot water jacket E. Chlorine is introduced through the pipe A and dissolves in the carbon tetrachloride and reacts with the lime. Air and carbon tetrachloride vapour pass through pipe C to condenser F and absorber G. At the end of the reaction, cold water is passed through the jacket E to reduce the temperature below 20° C. and convert the chloride of lime to crystalline form. The container B is then placed under vacuum and the carbon tetrachloride recovered by distillation and condensation in the condenser F.

In another apparatus, the lime is chlorinated in a mixer, and then passes to a grinding mill from which it is returned to the chlorination vessel. The greater part of the carbon tetrachloride is recovered by filtration and the rest by vacuum distillation.

318,116. LOW TEMPERATURE TAR AND ITS DISTILLATES, SEPARATING THE CONSTITUENTS OF. G. T. Morgan and D. D. Pratt, Chemical Research Laboratory, Teddington, Middlesex. Application date, April 28, 1928.

The phenol fraction (25-30 per cent.) of low temperature tar is first separated into a fraction of 10-15 per cent. of compounds soluble in alkali, and an asphaltic or resinous residue insoluble in aqueous alkali. The soluble fraction is treated with petroleum of low boiling point, or carbon tetrachloride so that certain phenols are dissolved. The petroleum may then be distilled off, leaving the purified phenols in the form of a crystallisable oil boiling between 180°-220° C. The insoluble residue may be treated with ether, benzene, or low temperature tar spirit, in which some of the resinols are soluble and others are not. The soluble resinols can be precipitated by adding low-boiling petroleum. The products can be used as a basis for lacquers or varnishes, or may be condensed with formaldehyde to obtain synthetic resins.

318,115. ARTIFICIAL RUBBER, MANUFACTURE OF. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfurt-on-Main, Germany. Application date, April 26, 1928.

Diolefines are emulsified with liquids such as those containing albumen, and then polymerised. The period of polymerisation can be reduced if it is conducted in the presence of organic

substances containing hydrogen peroxide in loose combination, or potassium fluoride combined with hydrogen peroxide. Suitable organic compounds are those with urea, betaine, pinacone, or sodium acetate. Colloids are also preferably added, such as Carragheen moss extract, gum-arabic, molasses, linseed meal extract, spent sulphite cellulose lye, etc. These substances may be pressed, filtered, or centrifuged to remove suspended matter. Other substances which favour polymerisation may also be added, such as materials which influence the surface tension, e.g., higher alcohols such as amyl alcohol, heptyl alcohol, or benzyl alcohol, also electrolytes or buffer mixtures. A large increase of yield of polymerisation products is obtained. Some examples are given of the polymerisation of isoprene and butadiene.

318,124. KETONES, MANUFACTURE OF. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfurt-on-Main, Germany. Application date, May 15, 1928.

Dihydric alcohols, i.e., aliphatic, cyclo-aliphatic, or aromatic hydrocarbons containing an open chain or side chain respectively with two hydroxyl radicals, are vaporised and passed over catalysts consisting of heavy metals of groups 1 and 8 or their compounds, particularly those containing copper. Alkaline activating agents may be added such as oxides, hydroxides, carbonates, formates, acetates, oxalates, phosphates, or silicates of the alkali metals or alkaline earth metals which are alkaline under the conditions of working. Another class of activating agents may also be added consisting of difficultly reducible oxides, i.e., those of thorium, aluminium, tungsten, chromium, silicon, cerium, titanium, manganese, magnesium, etc. The catalysts are preferably deposited on carriers, such as pumice, fullers' earth, diatomaceous earth, etc. Atmospheric pressure is employed and temperatures of 150°-300° C. examples are given of the treatment of 1 : 3-butylene-glycol to obtain methyl-ethyl-ketone, 2-methyl-1 : 3-butylene-glycol to obtain methyl-isopropyl-ketone, 2 : 4-pentandiol to obtain methyl-propyl-ketone, trimethyl-ethylene-glycol to obtain methylisopropyl-ketone. Some examples are also given of the preparation of the catalysts.

318,180. NITROGENOUS VAT DYESTUFFS, PRODUCTION OF. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfurt-on-Main, Germany. Application date, February 24, 1928.

These vat dyestuffs are obtained by condensing isocyclic compounds containing a number of negative substituents of identical or different character such as halogen or nitro groups simultaneously or successively with several different nitrogenous compounds each containing at least one reactive hydrogen atom on the nitrogen atom. At least one of the components should be capable of being vatted and at least one should contain a system of four, or more condensed rings. In a modification of this process, isocyclic compounds containing a number of nitrogen atoms and a reactive hydrogen atom attached to at least two nitrogen atoms are condensed simultaneously or successively with several different cyclic compounds containing a negative substituent. At least one of the negatively substituted compounds should be capable of being vatted, and at least one of the components should contain a system of four or more condensed rings. A large number of examples are given.

318,274. PHOSPHORIC ACID, PROCESS FOR THE MANUFACTURE OF. A. Carpmal, London. From I.G. Farbenindustrie Akt.-Ges., Frankfurt-on-Main, Germany. Application date, May 31, 1928.

In the usual process for the manufacture of phosphoric acid, the material containing calcium phosphate is treated with dilute sulphuric acid, but the phosphoric acid obtained is only about 20 per cent. strength. In this invention, concentrated phosphoric acid is obtained by treating the phosphate with an excess of concentrated sulphuric acid, and separating the calcium sulphate. The mixture of phosphoric acid and sulphuric acid obtained is then used repeatedly for treating fresh quantities of phosphate until the free sulphuric acid is

exhausted. The phosphoric acid is then filtered off from the calcium sulphate.

318,296. EMULSIONS OF DIOLEFINS, PRODUCTION OF. J. Y. Johnson, London. I.G. Farbenindustrie Akt.-Ges., Frankfurt-on-Main, Germany. Application date, June 1, 1928.

The constituent of the emulsifying agent which is soluble in diolefins, *e.g.*, fatty acids such as oleic, linoleic, and ricinoleic acids, or resinic acids is dissolved in the diolefine to be polymerised. This solution is added to an aqueous solution of inorganic or organic bases such as ammonia, to which buffer mixtures may be added. It is found that the emulsifying agent, *e.g.*, ammonium oleate, has a much greater emulsifying capacity when produced in this manner than if used in a ready prepared form. The resulting emulsion is more suitable for subsequent polymerisation.

318,404. FERTILIZERS AND HYDROCARBONS FROM COAL AND OTHER CARBONACEOUS MATERIAL, PRODUCTION OF. W. W. Harris, Chequers Farm, Windmill Road, Sunbury-on-Thames, Middlesex. Application date, September 26, 1928.

Coal, which may be mixed with wood or other vegetable matter, is mixed with quicklime and common salt, and treated in a steel cylinder with steam at a pressure of about 1,500 lbs. per square inch. The product is a fertilizer containing carbonates, nitrates, and other highly oxygenated compounds.

NOTE.—Abstracts of the following specifications which are now accepted, appeared in THE CHEMICAL AGE when they became open to inspection under the International Convention: 288,250 (Bozel-Maletra Soc. Industrielle de Produits Chimiques) relating to thermal disintegration of chrome ores or minerals containing chromium, see Vol. XVIII, p. 535; 291,361 (I.G. Farbenindustrie Akt.-Ges.) relating to 5:7-dialkyloxy-3-oxythionaphthenes and dyestuffs, see Vol. XIX, p. 105; 293,352 (I.G. Farbenindustrie Akt.-Ges.) relating to azo dyestuffs, see Vol. XIX, p. 219; 297,083 (Schering Kahlbaum Akt.-Ges.) relating to pure *m* and *p*-cresols, see Vol. XIX, p. 497; 305,458 (Aluminium Industrie Akt.-Ges.) relating to electrolytic production of aluminium, see Vol. XX, p. 39 (Metallurgical Section).

International Specifications not yet Accepted

316,542. BARIUM SULPHATE. Sachtleben Akt.-Ges. für Bergbau und Chemische Industrie, Homberg, Niederrhein, Germany. International Convention date, July 30, 1928.

Natural heavy spar is calcined under reducing conditions, *e.g.*, by means of bitumen contained in the spar. Spar free from bitumen may be ground, mixed with carbonaceous material, and calcined. The mass is then quenched in water and the sulphides formed from metal oxide impurities are removed by washing, wet grinding, and treatment with a small amount of sulphuric acid. Alternatively, the spar may be calcined under reducing or oxidising conditions and quenched in a solution of barium sulphide to form sulphides of the metals to be removed.

316,547. UNSATURATED ESTERS. Röhm and Haas Akt.-Ges., 42, Weiterstadterstrasse, Darmstadt, Germany. International Convention date, July 30, 1928.

Unsaturated esters are obtained by treating with bases, or salts of basic character, halogenised esters in which the halogen is loosely combined, such as β -halogenised esters. The production of the ethyl ester of acrylic acid is described.

316,548. POTASSIUM SALTS. Chemieverfahren Ges., 15, Wilhelmstrasse, Bochum, Germany. International Convention date, July 30, 1928. Addition to 311,226 (see THE CHEMICAL AGE, Vol. XXI, p. 34).

The process described in specification 311,226 is modified for the treatment of crude salt containing mainly sylvinit, carnallite, or carnallite and kieserite.

316,550. CALCIUM PHOSPHATES. F. C. and F. Palazzo, 34, Via Montebello, Florence, Italy. International Convention date, July 30, 1928.

Superphosphate is leached in two stages, first to obtain a concentrated liquor saturated with monophosphate and containing most of the free phosphoric acid, and then to obtain a liquor which is treated with milk of lime to precipitate dicalcium phosphate. This is washed and dried, and treated with the first liquor to obtain monocalcium phosphate or a mixture with dicalcium phosphate. The product is dried at 50° C. under reduced pressure.

316,583. FERTILISERS. A. Holz, 18, Sherman Place, Irvington, N.J., U.S.A. International Convention date, July 31, 1928.

Sulphur vapour is treated with steam at 1000° C. in a vessel of quartz or alundum, in the presence of a catalyst of granular iron, nickel, cobalt, or bauxite. Alternatively, pyrites, or sulphide of copper, zinc, lead, or calcium may be heated with superheated steam. Hydrogen and sulphur dioxide are obtained and may be separated by cooling or by absorbing the sulphur dioxide in water. The hydrogen is converted into ammonia, and the sulphur dioxide into sulphuric acid, which is used for treating rock phosphate. After removal of one-third of the calcium sulphate, ammonia is added to produce di-ammonium phosphate. On increase of pressure this reacts with calcium sulphate to produce di-calcium phosphate and ammonium sulphate. The two may be used together as a mixed fertiliser, or they may be separated. The calcium sulphate removed may be treated with ammonia and carbon dioxide to obtain ammonium sulphate.

316,605. DICALCIUM PHOSPHATE MANURES. T. C. and T. Palazzo, Via Montebello, Florence, Italy. International Convention date, August 1, 1928.

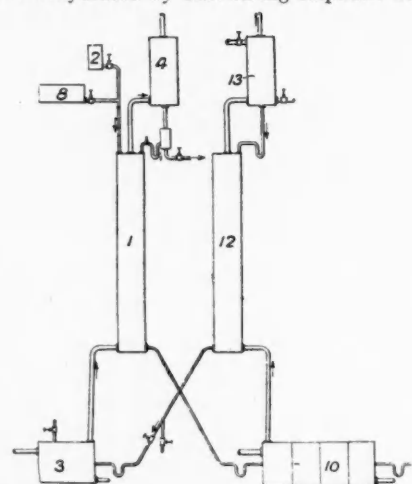
Materials containing tricalcium phosphate are treated with nitric acid of 30 per cent.-50 per cent. strength, to obtain phosphoric acid and calcium nitrate. This is treated with a 12 per cent.-25 per cent. solution of sodium, potassium, or ammonium hydroxide to precipitate dicalcium phosphate, leaving a mixed solution of calcium and alkali nitrates, which may be evaporated to obtain the solid salts.

316,664. FERTILISERS. Appareils et Evaporateurs Kestner, 7, Rue de Taul, Lille, France. International Convention date, August 2, 1928.

Calcium nitrate solution is concentrated to 82 per cent. and then mixed with ammonium nitrate. The mixed nitrate obtained is non-deliquescent.

316,684. CONCENTRATING ACIDS. Imperial Chemical Industries, Ltd., Millbank, London, S.W.1. (Assignees of F. C. Zeisberg.) International Convention date, August 2, 1928.

Dilute nitric acid vapour passes from a vessel 3 to a tower 1 where it is dehydrated by cold strong sulphuric acid from a



316,684

vessel 2 and weak nitric acid from a vessel 8. Concentrated nitric acid is condensed in a vessel 4, and the dehydrating liquor passes to a vessel 10 where nitric acid is evaporated and passes to a dephlegmator 12 and condenser 13. The dilute nitric acid is returned to the vessel 3.

LATEST NOTIFICATIONS.

319,205. Process for the catalytic alkylation of compounds and the isomerisation and conversion of the resulting alkyl compounds. Rheinische Kampfer Fabrik Ges. September 17, 1928.

319,320. Process for substantially suppressing phosgene formation when extinguishing fires with carbon tetrachloride. I.G. Farbenindustrie Akt.-Ges. September 20, 1928.

- 319,272. Process of casting light metals, more particularly magnesium and alloys thereof in sand moulds. I.G. Farbenindustrie Akt.-Ges. September 19, 1928.
- 319,273. Process for the manufacture and production of C-alkyl and C-alkyl derivatives of aromatic compounds. Z. Földi September 19, 1928.
- 319,210. Process for treatment of acid tars or resins. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. September 17, 1928.
- 319,329. Process of purifying liquids containing arsenic and selenium as impurities. Metallges. Akt.-Ges. September 20, 1928.
- 319,243. Manufacture of artificial fibres, bands or the like. I.G. Farbenindustrie Akt.-Ges. September 18, 1928.
- 319,247. Manufacture of azo-dyestuffs. I.G. Farbenindustrie Akt.-Ges. September 18, 1928.
- 319,249. Manufacture of new condensation products and their application. Soc. of Chemical Industry in Basle. September 18, 1928.
- 319,285. Process for the manufacture of cellulose nitro-acetates. I.G. Farbenindustrie Akt.-Ges. September 19, 1928.
- 319,365. Manufacture of new vat-dyestuffs. Soc. of Chemical Industry in Basle. September 21, 1928.
- 319,370. Manufacture of colour lakes and dye-stuff compositions suitable for use in printing. I.G. Farbenindustrie Akt.-Ges. September 22, 1928.
- 319,371. Manufacture of artificial material. I.G. Farbenindustrie Akt.-Ges. September 22, 1928.
- 319,584. Process for immunising textile fibres to direct-dyeing dyestuffs. Soc. of Chemical Industry in Basle. September 21, 1928.
- 319,585. Manufacture of yellow-wool dyestuffs. I.G. Farbenindustrie Akt.-Ges. September 21, 1928.
- 319,587. Process of polymerising vinyl derivatives. Du Pont de Nemours and Co., E. I. September 22, 1928.
- 319,588. Process of polymerising vinyl derivatives. Du Pont de Nemours and Co., E. I. September 22, 1928.
- 319,589. Process of preparing vinyl esters of organic acids. Du Pont de Nemours and Co., E. I. September 22, 1928.
- 319,590. Process of polymerising vinyl derivatives. Du Pont de Nemours and Co., E. I. September 22, 1928.
- 319,591. Process of producing alpha polymer of vinyl chloride. Du Pont de Nemours and Co., E. I. September 22, 1928.

Specifications Accepted with Date of Application

- 290,253. Yellow azo-dyestuffs, Manufacture of. I.G. Farbenindustrie Akt.-Ges. May 11, 1927.
- 292,129. Ammonium salts, Manufacture of. Montecatini Soc. Generale per l'Industria Mineraria ed Agricola. June 14, 1927.
- 292,130. Electrolytic cells. Montecatini Soc. Generale per l'Industria Mineraria ed Agricola. June 14, 1927.
- 295,276. Condensation products from acetylene and ammonia, Manufacture of. I.G. Farbenindustrie Akt.-Ges. August 8, 1927.
- 297,051. Vulcanising caoutchouc. Goodyear Tire and Rubber Co. September 13, 1927.
- 298,137. Acetic acid, Process for concentrating. A. Wacker Ges. für Elektro Chemische Industrie Ges. October 3, 1927.
- 298,493. Alkoxy-3-oxy-thionaphthenes, Manufacture of. I.G. Farbenindustrie Akt.-Ges. October 8, 1927.
- 300,922. Green vat dyestuff from 1:12 perylene-quinone, Process for manufacturing. F. Bensa. November 19, 1927.
- 301,387. Homogeneous mixture of fertilisers, Process for manufacturing. Stockholms Superfosfat Fabriks Aktiebolag. November 28, 1927.
- 303,055. Calcining zinc blende, Process and apparatus for. Balz-Erzröstung Ges. December 27, 1927.
- 306,471. Catalytic reduction of oxides of carbon and organic oxygen compounds. Selden Co. February 21, 1928.
- 318,882. Disazo dyestuffs, Manufacture of. A. Carpmal (I.G. Farbenindustrie Akt.-Ges.). June 11, 1928.
- 318,842 and 318,909. Fertilisers, Production of. J. Y. Johnson. (I.G. Farbenindustrie Akt.-Ges.). March 10, 1928.
- 318,937. Pigments and the like, Preparation of. J. W. C. Crawford, G. E. Scharff, and Imperial Chemical Industries, Ltd. March 9, 1928.
- 318,939. Aromatic hydroxy aldehydes, Separation, isolation and purification of. Graesser Monsanto Chemical Works, Ltd., and D. P. Hudson. May 11, 1928.
- 319,025. Diolefines, Recovery of. J. Y. Johnson. (I.G. Farbenindustrie Akt.-Ges.). March 12, 1928.
- 319,030. Aliphatic esters and acids, Manufacture of. H. Dreyfus. March 16, 1928.
- 319,075. Ortho-carboxyamido-aryl thio-glycolic acids, Manufacture of. A. Carpmal. (I.G. Farbenindustrie Akt.-Ges.) June 19, 1928.
- 319,149. Vic-trihalogen benzenes, Process for the manufacture of. A. Carpmal. (I.G. Farbenindustrie Akt.-Ges.) October 4, 1928.
- 319,147. Regenerating potassium ferro-cyanide in gas purification, Method of and apparatus for. R. Brandt. October 4, 1928.

- 319,166. Sulphuric acid, Process for the production of. Metallges. Akt.-Ges., and H. E. Woisin. December 12, 1928.

Applications for Patents

- Bannister, S. H., and Olpin, H. C. Manufacture of organic compounds. 29,174. September 26.
- British Acetate Silk Corporation, Ltd. Manufacture of artificial silk. 28,819. September 23.
- Manufacture of cellulose esters. 28,820. September 23.
- Production of viscose silk. 28,821. September 23.
- British Celanese, Ltd. Manufacture of aliphatic compounds. 28,737. September 23.
- Manufacture of organic compounds. 29,174. September 26.
- Carpmael, A., and I.G. Farbenindustrie Akt.-Ges. Manufacture of auxiliary materials for dyeing, etc. 28,859. September 23.
- Process for purification of sulphur. 28,984. September 24.
- Carpmael. Electric blasting fuses. 28,985. September 24.
- Manufacture of aromatic amino-aldehyde compounds. 28,986. September 24.
- Manufacture of monoazo-dyestuffs. 28,987. September 24.
- Manufacture of alkali fluorides. 28,988. September 24.
- Protecting wool, etc., against moth, etc. 29,089. September 25.
- Manufacture of lacquer coatings, films, etc. 29,240. September 26.
- Protecting wool, etc., from moths, etc. 29,382, 29,383. September 27.
- Condensation products. 29,473. September 28.
- Dyestuffs. 29,474. September 28.
- Du Pont de Nemours and Co., E. I. Polymerization vinyl derivatives. 28,826, 28,827, 28,829. September 23. (United States, September 22, 1928.)
- Preparation of vinyl esters of organic acids. 28,828. September 23. (United States, September 22, 1928.)
- Production of alpha polymer of vinyl chloride. 28,830. September 23. (United States, September 22, 1928.)
- Feuerstein, K., and Pauly, H. Production of vanillin. 29,291. September 27. (Germany, September 27, 1928.)
- Frischer, H. Apparatus for treating nitric acid. 29,208. September 26.
- Groves, W. W. (I.G. Farbenindustrie Akt.-Ges.). Manufacture of arylamino phenol-carboxylic acids. 29,433. September 28.
- I.G. Farbenindustrie Akt.-Ges. and Johnson, J. Y. Tightening means for internal-combustion engines. 28,782. September 23.
- Packing device for internal-combustion engines. 28,783. September 23.
- Production of monohalogen 3:4:8:9-dibenzopyrene-5:10:quinones. 28,784. September 23.
- Recovery of unsaturated hydrocarbons, etc., from mixtures. 28,930. September 24. (July 30.)
- Manufacture of diolefines. 28,931. September 24.
- Dehalogenation of organic halogen compounds. 28,932. September 24.
- Manufacture of azo dyestuffs. 29,043. September 25.
- Apparatus for operation of internal-combustion engines. 29,178. September 26.
- Treatment of combustible substances. 29,446. September 28.
- I.G. Farbenindustrie Akt.-Ges. and Imray, O. Y. Manufacture of arylamino-phenol-carboxylic acids. 29,340. September 27.
- I.G. Farbenindustrie Akt.-Ges. Manufacture of arylamino-phenol-carboxylic acids. 29,433. September 28.
- Manufacture of yellow wool dyestuffs. 28,794. September 23. (Germany, September 21, 1928.)
- Production of carbon disulphide. 28,964. September 24. (Germany, November 17, 1928.)
- Manufacture of plastic masses. 29,193. September 26. (Germany, October 25, 1928.)
- Magazines for motion-picture cameras. 29,194. September 26. (Germany, October 30, 1928.)
- Recovery of carbazole. 29,445. September 28. (Germany, October 24, 1928.)
- Heterocyclic compounds. 29,475. September 28. (Germany, September 29, 1928.)
- Imperial Chemical Industries, Ltd. Halogenation of aromatic compounds. 29,177. September 26.
- Treatment of light hydrocarbons, etc. 29,420, 29,421. September 28.
- Maclaurin, R. Treatment of ammonia liquor effluents. 28,899. September 24.
- Recovering acid ammonium carbonate from ammonia liquors. 28,900. September 24.
- Refiners, Ltd., and Weiss, J. M. Production of resins. 29,035. September 25.
- Soc. of Chemical Industry in Basle. Immunising textile fibres to dyestuffs. 28,793. September 23. (Switzerland, September 21, 1928.)

Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at makers' works.

General Heavy Chemicals

ACID ACETIC, 40% TECH.—£19 per ton.
 ACID BORIC, COMMERCIAL.—Crystal, £30 per ton; powder, £32 per ton; extra fine powder, £34 per ton.
 ACID HYDROCHLORIC.—3s. 9d. to 6s. per carboy d/d, according to purity, strength and locality.
 ACID NITRIC, 80° TW.—£21 10s. to £27 per ton, makers' works according to district and quality.
 ACID SULPHURIC.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations; 140° TW., Crude Acid, 60s. per ton. 168° TW., Arsenical, £5 10s. per ton. 168° TW., Non-arsenical, £6 15s. per ton.
 AMMONIA ALKALI.—£6 15s. per ton f.o.r. Special terms for contracts.
 BISULPHITE OF LIME.—£7 10s. per ton, f.o.r. London, packages free.
 BLEACHING POWDER.—Spot, £9 10s. per ton d/d; Contract, £8 10s. per ton d/d, 4-ton lots.
 BORAX, COMMERCIAL.—Crystals, £19 10s. to £20 per ton; granulated, £19 per ton; powder, £21 per ton. (Packed in 2 cwt. bags carriage paid any station in Great Britain.)
 CALCIUM CHLORIDE (SOLID).—£5 to £5 5s. per ton d/d carr. paid.
 COPPER SULPHATE.—£25 to £25 10s. per ton.
 METHYLATED SPIRIT 61 O.P.—Industrial, 1s. 3d. to 1s. 8d. per gall. pyridinised industrial, 1s. 5d. to 1s. 10d. per gall.; mineralised 2s. 4d. to 2s. 8d. per gall.; 64 O.P., 1d. extra in all cases.
 NICKEL SULPHATE.—£38 per ton d/d.
 NICKEL AMMONIA SULPHATE.—£38 per ton d/d.
 POTASH CAUSTIC.—£30 to £33 per ton.
 POTASSIUM BICHROMATE.—4½d. per lb.
 POTASSIUM CHLORATE.—3½d. per lb., ex-wharf, London, in cwt. kegs.
 SALAMMONIAC.—£45 to £50 per ton d/d. Chloride of ammonia, £37 to £45 per ton, carr. paid.
 SALT CAKE.—£3 15s. to £4 per ton d/d. In bulk.
 SODA CAUSTIC, SOLID.—Spot lots delivered, £15 2s. 6d. to £18 per ton, according to strength; 20s. less for contracts.
 SODA CRYSTALS.—£5 to £5 5s. per ton, ex railway depots or ports.
 SODIUM ACETATE 97/98%.—£21 per ton.
 SODIUM BICARBONATE.—£10 10s. per ton, carr. paid.
 SODIUM BICHROMATE.—3½d. per lb.
 SODIUM BISULPHITE POWDER, 60/62%.—£17 10s. per ton delivered for home market, 1-cwt. drums included; £15 10s. f.o.r. London.
 SODIUM CHLORATE.—2½d. per lb.
 SODIUM NITRITE, 100% BASIS.—£27 per ton d/d.
 SODIUM PHOSPHATE.—£14 per ton, f.o.b. London, casks free.
 SODIUM SULPHATE (GLAUBER SALTS).—£3 12s. 6d. per ton.
 SODIUM SULPHIDE CONC. SOLID, 60/65.—£13 5s. per ton d/d. Contract, £13. Carr. paid.
 SODIUM SULPHIDE CRYSTALS.—Spot, £8 12s. 6d. per ton d/d. Contract, £8 10s. Carr. paid.
 SODIUM SULPHITE, PEA CRYSTALS.—£14 per ton f.o.b. London, 1-cwt. kegs included.

Coal Tar Products

ACID CARBOLIC CRYSTALS.—7d. to 9½d. per lb. Crude 60's, 2s. 3½d. to 2s. 5d. per gall.
 ACID CRESYLIC 99/100.—2s. 2d. to 2s. 7d. per gall. Pure, 5s. to 5s. 3d. per gall. 97/99.—2s. 1d. to 2s. 2d. per gall. Pale, 95%, 1s. 9d. to 1s. 10d. per gall. 98%, 2s. 1d. to 2s. 4d. Dark, 1s. 6d. to 1s. 10d. Refined, 2s. 7d. to 2s. 9d. per gall.
 ANTHRACENE.—A quality, 2d. to 2½d. per unit. 40%, £4 10s. per ton.
 ANTHRACENE OIL, STRAINED, 1080/1090.—4½d. to 5½d. per gall. 1100, 5½d. to 6d. per gall.; 1110, 6d. to 6½d. per gall. Unstrained (Prices only nominal).
 BENZOLE.—Prices at works: Crude, 10d. to 11d. per gall.; Standard Motor, 1s. 5d. to 1s. 6d. per gall.; 90%, 1s. 7d. to 1s. 8d. per gall.; Pure, 1s. 10d. to 1s. 11d. per gall.
 TOLUOLE.—90%, 1s. 9d. to 2s. 1d. per gall. Firm. Pure, 1s. 11d. to 2s. 3d. per gall.
 XYLOL.—1s. 5d. to 1s. 10d. per gall. Pure, 1s. 8d. to 2s. 1d. per gall.
 CREOSOTE.—Cresylic, 20/24%, 6½d. to 7d. per gall.; Heavy, 6½d. to 6½d. per gall. Middle oil, 4½d. to 5d. per gall. Standard specification, 3d. to 4d. per gall. Light gravity, 2d. to 2½d. per gall. ex works. Salty, 7½d. per gall.
 NAPHTHA.—Crude, 8½d. to 8½d. per gall. Solvent, 90/160, 1s. 3d. to 1s. 3½d. per gall. Solvent, 95/160, 1s. 4d. to 1s. 5d. per gall. Solvent 90/190, 1s. to 1s. 3d. per gall.
 NAPHTHALENE, CRUDE.—Drained Creosote Salts, £4 10s. to £5 per ton. Whizzed, £5 per ton. Hot pressed, £8 10s. per ton.
 NAPHTHALENE.—Crystals, £12 5s. per ton. Purified Crystals, £14 10s. per ton. Quiet. Flaked, £14 to £15 per ton, according to districts.
 PITCH.—Medium soft, 45s. to 47s. 6d. per ton, f.o.b., according to district. Nominal.
 PYRIDINE.—90/140, 3s. 9d. to 4s. per gall. 90/160, 3s. 6d. to 3s. 9d. per gall. 90/180, 1s. 9d. to 2s. 3d. per gall. Heavy, prices only nominal.

Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated:
 ACID AMIDONAPHTHOL DISULPHO (1-8-2-4).—10s. 9d. per lb.
 ACID ANTHRANILIC.—6s. per lb. 100%.
 ACID BENZOIC.—1s. 8½d. per lb.
 ACID GAMMA.—4s. 6d. per lb.
 ACID H.—3s. per lb.
 ACID NAPHTHONIC.—1s. 6d. per lb.
 ACID NEVILLE AND WINTHER.—4s. 9d. per lb.
 ACID SULPHANILIC.—8½d. per lb.
 ANILINE OIL.—8d. per lb. naked at works.
 ANILINE SALTS.—8d. per lb. naked at works.
 BENZALDEHYDE.—2s. 3d. per lb.
 BENZIDINE BASE.—3s. 3d. per lb. 100% basis d/d.
 BENZOIC ACID.—1s. 8½d. per lb.
 o-CRESOL 29/31° C.—£2 18s. 4d. to £3 9s. 4d. per cwt.
 m-CRESOL 98/100%.—2s. 9d. per lb. in ton lots d/d.
 p-CRESOL 32/34° C.—1s. 11d. per lb. in ton lots d/d.
 DICHLORANILINE.—1s. 10d. per lb.
 DIMETHYLANILINE.—1s. 11d. per lb.
 DINITROBENZENE.—8d. per lb. naked at works. £75 per ton.
 DINITROCHLOROBENZENE.—£84 per ton d/d.
 DINITROTOLUENE.—48/50° C. 7½d. per lb. naked at works. 66/68° C, 9d. per lb. naked at works.
 DIPHENYLAMINE.—2s. 10d. per lb. d/d.
 a-NAPHTHOL.—2s. per lb. d/d.
 B-NAPHTHOL.—10d. per lb. d/d.
 a-NAPHTHYLAMINE.—1s. 3d. per lb.
 B-NAPHTHYLAMINE.—3s. per lb.
 o-NITRANILINE.—5s. 9d. per lb.
 m-NITRANILINE.—3s. per lb. d/d.
 p-NITRANILINE.—1s. 8d. per lb.
 NITROBENZENE.—6d. per lb. naked at works.
 NITRONAPHTHALENE.—1s. 3d. per lb.
 R. SALT.—2s. 2d. per lb.
 SODIUM NAPHTHONATE.—1s. 8½d. per lb. 100% basis d/d.
 o-TOLUIDINE.—8d. per lb.
 p-TOLUIDINE.—1s. 9d. per lb. naked at works.
 m-XYLIDINE ACETATE.—2s. 6d. per lb. 100%.
 N. W. ACID.—4s. 9d. per lb. 100%.

Wood Distillation Products

ACETATE OF LIME.—Brown, £9 15s. to £10 5s. per ton. Grey, £16 10s. to £17 10s. per ton. Liquor, 9d. per gall.
 ACETONE.—£78 per ton.
 CHARCOAL.—£6 to £8 10s. per ton, according to grade and locality.
 IRON LIQUOR.—1s. 3d. per gall. 32° TW. 1s. per gall. 24° TW.
 RED LIQUOR.—9d. to 10½d. per gall. 16° TW.
 WOOD CRESOTE.—1s. 9d. per gall. Unrefined.
 WOOD NAPHTHA, MISCIBLE.—3s. 8d. to 3s. 11d. per gall. Solvent, 4s. to 4s. 3d. per gall.
 WOOD TAR.—£3 10s. to £4 10s. per ton.
 BROWN SUGAR OF LEAD.—£38 per ton.

Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 6½d. to 1s. 3d. per lb. according to quality; Crimson, 1s. 4d. to 1s. 6d. per lb., according to quality.
 ARSENIC SULPHIDE, YELLOW.—1s. 10d. to 2s. per lb.
 BARYTES.—£5 10s. to £7 per ton, according to quality.
 CADMIUM SULPHIDE.—5s. to 6s. per lb.
 CARBON BISULPHIDE.—£25 to £27 10s. per ton, according to quantity.
 CARBON BLACK.—5½d. per lb., ex wharf.
 CARBON TETRACHLORIDE.—£40 to £50 per ton, according to quantity, drums extra.
 CHROMIUM OXIDE, GREEN.—1s. 2d. per lb.
 DIPHENYLGUANIDINE.—3s. 9d. per lb.
 INDIARUBBER SUBSTITUTES, WHITE AND DARK.—4½d. to 5½d. per lb.
 LAMP BLACK.—£30 per ton, barrels free.
 LEAD HYPOSULPHITE.—9d. per lb.
 LITHOPONE, 30%.—£20 to £22 per ton.
 MINERAL RUBBER "RUBPRON".—£13 12s. 6d. per ton, f.o.r. London.
 SULPHUR.—£10 to £13 per ton, according to quality.
 SULPHUR CHLORIDE.—4d. to 7d. per lb., carboys extra.
 SULPHUR PRECIP. B. P.—£55 to £60 per ton.
 THIOCARBAMIDE.—2s. 6d. to 2s. 9d. per lb., carriage paid.
 THIOCARBANILIDE.—2s. 1d. to 2s. 3d. per lb.
 VERMILION, PALE OR DEEP.—6s. 6d. to 6s. 9d. per lb.
 ZINC SULPHIDE.—8d. to 11d. per lb.

Pharmaceutical and Photographic Chemicals

ACID, ACETIC, PURE, 80%.—£37 per ton ex wharf London, barrels free.
 ACID, ACETYL SALICYLIC.—2s. 9d. to 2s. 11d. per lb., according to quantity.
 ACID, BENZOIC, B.P.—2s. to 3s. 3d. per lb., according to quantity. Solely ex Gum, 1s. 6d. per oz.; 50-oz. lots, 1s. 3d. per oz.

ACID, BORIC B.P.—Crystal, 36s. to 39s. per cwt.; powder, 40s. to 43s. per cwt.; extra fine powder, 42s. per cwt., according to quantity. Carriage paid any station in Great Britain, in ton lots.

ACID, CAMPHORIC.—19s. to 21s. per lb.

ACID, CITRIC.—2s. 0½d. to 2s. 1d. per lb., less 5%.

ACID, GALLIC.—2s. 8d. per lb. for pure crystal, in cwt. lots.

ACID, MOLYBDIC.—5s. 3d. per lb. in ½ cwt. lots. Packages extra. Special prices for quantities and contracts.

ACID, PYROGALLIC, CRYSTALS.—7s. 3d. per lb. Resublimed, 8s. 3d. ACID, SALICYLIC, B.P. PULV.—1s. 5d. to 1s. 7d. per lb. Technical.—10½d. to 1s. 2d. per lb.

ACID, TANNIC B.P.—2s. 8d. to 2s. 10d. per lb.

ACID, TARTARIC.—1s. 5d. per lb., less 5%.

ACETANILIDE.—1s. 5d. to 1s. 8d. per lb. for quantities.

AMIDOL.—7s. 6d. to 9s. per lb., d/d.

AMIDOPYRIN.—7s. 9d. to 8s. per lb.

AMMONIUM BENZOATE.—3s. 3d. to 3s. 9d. per lb., according to quantity. 18s. per lb. ex Gum.

AMMONIUM CARBONATE B.P.—£36 per ton. Powder, £39 per ton in 5 cwt. casks. Resublimed, 1s. per lb.

AMMONIUM MOLYBDATE.—4s. 9d. per lb. in ½ cwt. lots. Packages extra. Special prices for quantities and contracts.

ATROPHINE SULPHATE.—9s. per oz.

BARBITONE.—5s. 9d. to 6s. per lb.

BENZONAPHTHOL.—3s. to 3s. 3d. per lb. spot.

BISMUTH CARBONATE.—8s. 9d. per lb.

BISMUTH CITRATE.—8s. 3d. per lb.

BISMUTH SALICYLATE.—8s. 3d. per lb.

BISMUTH SUBNITRATE.—7s. 6d. per lb.

BISMUTH NITRATE.—Cryst. 5s. 3d. per lb.

BISMUTH OXIDE.—11s. 3d. per lb.

BISMUTH SUBCHLORIDE.—10s. 3d. per lb.

BISMUTH SUBGALLATE.—7s. 3d. per lb. Extra and reduced prices for smaller and larger quantities of all bismuth salts respectively.

BISMUTH ET AMMON LIQUOR.—Cit. B.P. in W. Qts. 1s. 0½d. per lb.; 12 W. Qts. 11½d. per lb.; 36 W. Qts. 11d. per lb.

BORAX B.P.—Crystal, 24s. to 27s. per cwt.; powder, 25s. to 28s. per cwt., according to quantity. Carriage paid any station in Great Britain, in ton lots.

BROMIDES.—Ammonium, 1s. 11½d. per lb.; potassium, 1s. 8½d. per lb.; granular, 1s. 7½d. per lb.; sodium, 1s. 10½d. per lb. Prices for 1 cwt. lots.

CALCIUM LACTATE.—B.P., 1s. 2d. to 1s. 3d. per lb., in 1-cwt. lots.

CAMPOR.—Refined flowers, 3s. 3d. to 3s. 4d. per lb., according to quantity; also special contract prices.

CHLORAL HYDRATE.—3s. 1d. to 3s. 4d. per lb.

CHLOROFORM.—2s. 4½d. to 2s. 7½d. per lb., according to quantity.

CREOSOTE CARBONATE.—6s. per lb.

ETHERS.—S.G. .730—11d. to 1s. per lb., according to quantity

other gravities at proportionate prices.

FORMALDEHYDE, 40%—37s. per cwt., in barrels, ex wharf.

GUAIACOL CARBONATE.—4s. 6d. to 4s. 9d. per lb.

HEXAMINE.—2s. 3d. to 2s. 6d. per lb.

HOMATROPINE HYDROBROMIDE.—30s. per oz.

HYDRASTINE HYDROCHLORIDE.—English make offered at 120s. per oz.

HYDROGEN PEROXIDE (12 vols.)—1s. 4d. per gallon, f.o.r. makers' works, naked. Winchesters, 2s. 11d. per gall. B.P., 10 vols., 2s. to 2s. 3d. per gall.; 20 vols., 4s. per gall.

HYDROQUINONE.—3s. 9d. to 4s. per lb., in cwt. lots.

HYPOPHOSPHITES.—Calcium, 2s. 5d. per lb.; potassium, 2s. 8½d. per lb.; sodium, 2s. 7½d. per lb., in 1 cwt. lots, assorted.

IRON AMMONIUM CITRATE.—B.P., 2s. 8d. to 2s. 11d. per lb. Green, 3s. 1d. to 3s. 4d. per lb. U.S.P., 2s. 9d. to 3s. per lb.

IRON PERCHLORIDE.—18s. to 20s. per cwt., according to quantity.

IRON QUININE CITRATE.—B.P., 8½d. to 9½d. per oz., according to quantity.

MAGNESIUM CARBONATE.—Light commercial, £31 per ton net.

MAGNESIUM OXIDE.—Light commercial, £62 10s. per ton, less 2½%; Heavy commercial, £21 per ton, less 2½%; in quantity lower; Heavy Pure, 2s. to 2s. 3d. per lb.

MENTHOL.—A.B.R. recrystallised B.P., 10s. per lb. net; Synthetic, 10s. 6d. to 12s. per lb.; Synthetic detached crystals 10s. 6d. to 16s. per lb., according to quantity; Liquid (95%), 9s. per lb.

MERCURIALS B.P.—Up to 1 cwt. lots, Red Oxide, crystals, 8s. 4d. to 8s. 5d. per lb., levig., 7s. 10d. to 7s. 11d. per lb.; Corrosive Sublimed, Lump, 6s. 7d. to 6s. 8d. per lb., Powder, 6s. to 6s. 1d. per lb.; White Precipitate, Lump, 6s. 9d. to 6s. 10d. per lb., Powder, 6s. 10d. to 6s. 11d. per lb., Extra Fine, 6s. 11d. to 7s. per lb.; Calomel, 7s. 2d. to 7s. 3d. per lb.; Yellow Oxide, 7s. 8d. to 7s. 9d. per lb.; Persulph, B.P.C., 6s. 11d. to 7s. per lb.; Sulph. nig., 6s. 8d. to 6s. 9d. per lb. Special prices for larger quantities.

METHYL SALICYLATE.—1s. 6d. to 1s. 8d. per lb.

METHYL SULPHONAL.—18s. 6d. to 20s. per lb.

METOL.—9s. to 11s. 6d. per lb. British make.

PARAFORMALDEHYDE.—1s. 9d. per lb. for 100% powder.

PARALDEHYDE.—1s. 4d. per lb.

PHENACETIN.—3s. 2½d. per lb.

PHENAZONE.—5s. 11d. to 6s. 1½d. per lb.

PHENOLPHTHALEIN.—5s. 11d. to 6s. 1½d. per lb.

POTASSIUM BITARTRATE 99/100% (Cream of Tartar).—102s. to 104s. per cwt., less 2½ per cent.

POTASSIUM CITRATE.—B.P.C., 2s. 7d. per lb. in 1 cwt. lots.

POTASSIUM FERRICYANIDE.—1s. 9d. per lb., in cwt. lots.

POTASSIUM IODIDE.—16s. 8d. to 17s. 2d. per lb., according to quantity.

POTASSIUM METABISULPHITE.—6d. per lb., 1-cwt. kegs included f.o.r. London.

POTASSIUM PERMANGANATE.—B.P. crystals, 5½d. per lb., spot.

QUININE SULPHATE.—1s. 8d. to 1s. 9d. per oz., bulk in 100 oz. tins.

RESORCIN.—2s. 10d. to 3s. per lb., spot.

SACCHARIN.—43s. 6d. per lb.

SALOL.—2s. 3d. to 2s. 6d. per lb.

SODIUM BENZOATE, B.P.—1s. 8d. to 1s. 11d. per lb.

SODIUM CITRATE, B.P.C., 1911.—2s. 4d. per lb., B.P.C. 1923—2s. 7d. per lb. Prices for 1 cwt. lots. U.S.P., 2s. 6d. to 2s. 9d. per lb., according to quantity.

SODIUM FERROCYANIDE.—4d. per lb., carriage paid.

SODIUM HYPOSULPHITE, PHOTOGRAPHIC.—£15 per ton, d/d consignee's station in 1-cwt. kegs.

SODIUM NITROPRUSSIDE.—16s. per lb.

SODIUM POTASSIUM TARTRATE (ROCHELLE SALT).—100s. to 105s. per cwt. Crystals, 5s. per cwt. extra.

SODIUM SALICYLATE.—Powder, 2s. 2d. to 2s. 5d. per lb. Crystal, 2s. 3d. to 2s. 6d. per lb.

SODIUM SULPHIDE, PURE RECRYSTALLISED.—10d. to 1s. 1d. per lb.

SODIUM SULPHITE, ANHYDROUS.—£27 10s. to £29 10s. per ton, according to quantity. Delivered U.K.

SULPHONAL.—9s. 6d. to 10s. per lb.

TARTAR EMETIC, B.P.—Crystal or powder, 2s. 1d. to 2s. 3d. per lb.

THYMOL.—Puriss., 9s. 1d. to 9s. 4d. per lb., according to quantity. Firmer. Natural, 12s. per lb.

Perfumery Chemicals

ACETOPHENONE.—7s. per lb.

AUBEPINE (EX ANETHOL).—12s. per lb.

AMYL ACETATE.—2s. 6d. per lb.

AMYL BUTYRATE.—5s. per lb.

AMYL CINNAMIC ALDEHYDE.—17s. per lb.

AMYL SALICYLATE.—2s. 9d. per lb.

ANETHOL (M.P. 21/22° C.).—6s. 6d. per lb.

BENZALDEHYDE FREE FROM CHLORINE.—2s. 3d. per lb.

BENZYL ACETATE FROM CHLORINE-FREE BENZYL ALCOHOL.—1s. 10d. per lb.

BENZYL ALCOHOL FREE FROM CHLORINE.—1s. 10d. per lb.

BENZYL BENZOATE.—2s. 3d. per lb.

CINNAMIC ALDEHYDE NATURAL.—13s. 3d. per lb.

COUMARIN.—8s. 9d. per lb.

CITRONELLOL.—9s. per lb.

CITRAL.—8s. per lb.

ETHYL CINNAMATE.—6s. 6d. per lb.

ETHYL PHTHALATE.—3s. per lb.

EUGENOL.—11s. 9d. per lb.

GERANIOL (PALMAROSA).—21s. per lb.

GERANIOL.—6s. 6d. to 10s. per lb.

HELIOTROPINE.—6s. 6d. per lb.

ISO EUGENOL.—13s. 9d. per lb.

LINALOL.—Ex Bois de Rose, 12s. 6d. per lb. Ex Shui Oil, 10s. per lb.

LINALYL ACETATE.—Ex Bois de Rose, 16s. per lb. Ex Shui Oil, 12s. per lb.

METHYL ANTHRANILATE.—8s. per lb.

METHYL BENZOATE.—4s. per lb.

MUSK KETONE.—34s. per lb.

MUSK XYLOL.—7s. per lb.

NEROLIN.—3s. 9d. per lb.

PHENYL ETHYL ACETATE.—11s. per lb.

PHENYL ETHYL ALCOHOL.—10s. per lb.

RHODINOL.—56s. per lb.

SAFROL.—2s. 6d. per lb.

TERPINEOL.—1s. 6d. per lb.

VANILLIN, EX CLOVE OIL.—15s. to 17s. 6d. per lb. Ex Guaiacol 14s. to 15s. 6d. per lb.

Essential Oils

ALMOND OIL.—Foreign S.P.A., 10s. per lb.

ANISE OIL.—3s. 9d. per lb.

BERGAMOT OIL.—15s. 9d. per lb.

BOURBON GERANIUM OIL.—22s. per lb.

CANANGA OIL, JAVA.—11s. 6d. per lb.

CASSIA OIL, 80/85%.—6s. per lb.

CINNAMON OIL LEAF.—8s. per oz.

CITRONELLA OIL.—Java, 2s. 10d. per lb., c.i.f. U.K. port. Ceylon, pure, 2s. 4d. per lb.

CLOVE OIL (90/92%).—8s. 3d. per lb.

EUCALYPTUS OIL, AUSTRALIAN, B.P. 70/75%.—1s. 10d. per lb.

LAVENDER OIL.—Mont Blanc, 38/40%, 16s. per lb.

LEMON OIL.—14s. 6d. per lb.

LEMONGRASS OIL.—4s. per lb.

ORANGE OIL, SWEET.—18s. 3d. per lb.

OTTO OF ROSE OIL.—Anatolian, 70s. per oz. Bulgarian, 110s. per oz.

PALMA ROSA OIL.—12s. 6d. per lb.

PEPPERMINT OIL.—English, 87s. 6d. per lb.; Wayne County, 16s. 6d. per lb.; Japanese, 5s. 9d. per lb.

PETITGRAIN.—8s. 9d. per lb.

SANDALWOOD.—Mysore, 35s. per lb.; 90/95%, 19s. per lb.

London Chemical Market

The following notes on the London Chemical Market are specially supplied to THE CHEMICAL AGE by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing these firms' independent and impartial opinions.

London, October 3, 1929.

PRICES remain firm, and business has shown a steady improvement. The improvement in the export business has also been maintained.

General Chemicals

ACETONE is £75 to £85 per ton, and in steady demand.
ACETIC ACID is steady and in good demand at £36 10s. for 80% technical, with the usual extra for edible quality.
ACID CITRIC.—Firm at 2s. 3d. per lb., less 5%.
ACID LACTIC is in steady demand at £43 per ton for 50% by weight.
ACID OXALIC is in good request at £30 7s. 6d. to £32 per ton.
ACID TARTARIC is steady at 1s. 5d. per lb., less 5%.
ALUMINA SULPHATE.—Unchanged at £7 15s. to £8 per ton.
ARSENIC.—At £16 7s. 6d. per ton, free on rails at mines.
CREAM OF TARTAR.—99-100% B.P. continues very firm at £104 to £109 per ton.
COPPER SULPHATE is firm at £28 per ton.
FORMALDEHYDE.—In steady demand at £36 per ton in casks.
LEAD ACETATE.—Unchanged at £44 per ton for white, and £43 per ton for brown. Higher prices are expected in the near future.
LEAD NITRATE is steady at £33 15s. per ton.
LIME ACETATE.—Unchanged at £18 per ton.
LITHOPONE.—In steady request at £19 15s. to £23 per ton.
METHYL ACETONE.—Steady at £58 10s. per ton.
POTASSIUM CHLORATE.—Firm at £30 per ton.
POTASSIUM PERMANGANATE.—Firm at 5½d. to 5¾d. per lb., and in steady demand.
POTASSIUM PRUSSATE.—Unchanged at £63 10s. per ton to £65 10s., according to quantity, and very firm.

Nitrogen Products

Sulphate of Ammonia.—Although the market remains quiet, producers have advanced prices for October shipment to £8 18s. 9d. per ton, f.o.b. U.K. port in single bags, for neutral quality basis 20·6 per cent. nitrogen. It is anticipated that the prices will advance during the autumn and winter months until the peak price is reached for February-May shipments.

Home.—Some of the larger merchants purchased small quantities for end September delivery. No doubt this material will be stored. The announcement of prices up to the end of the year has stimulated interest in this product.

Nitrate of Soda.—Nitrate of Soda sales continue to be small, as buyers appear to be in no hurry to cover their requirements.

Latest Oil Prices

LONDON, October 2.—LINSEED OIL was very firm and about 20s. per ton higher. Spot, ex mill, £45; October, £42 2s. 6d.; November-December, £41 15s.; and January-April, £41 2s. 6d., naked. RAPE OIL was quiet. Crude, extracted, £45; technical, refined, £46 10s., naked, ex wharf. COTTON OIL was slow. Egyptian, crude, £35; refined common edible, £38; and deodorised, £40, naked, ex mill. TURPENTINE was firm and 3d. per cwt. higher. American, spot, 45s. 3d.; November-December, 45s. 6d.; and January-April, 47s.

HULL.—LINSEED OIL.—Spot and October, £44; November-December, £43 15s.; January-April, £42 10s. per ton, naked. COTTON OIL.—Egyptian, crude, spot, £34 10s.; November-December (new), £33; edible refined, spot, £38 10s.; technical, spot, £38; deodorised, spot, £40 10s. per ton, naked. PALM KERNEL OIL.—Crude, 5½ per cent., spot, £34 10s. per ton, naked. GROUNDNUT OIL.—Crushed-extracted, spot, £38 10s.; deodorised, spot, £42 10s. per ton. SOYA OIL.—Extracted and crushed, spot, £35 10s.; deodorised, spot, £39 per ton. RAPE OIL.—Crushed-extracted, spot, £43 10s.; refined, spot, £45 10s. per ton. TURPENTINE.—Spot, 47s. 6d. per cwt., net cash terms, ex mills. CASTOR OIL and COD OIL unchanged.

South Wales By-Products

THERE is very little change to record in South Wales by-product activities. Business generally is slow, values of most products being unaltered. Pitch remains an interesting feature. Continental buyers have apparently been taking supplies, and prices for delivery in South Wales are firm on a basis of 50s. to 55s. per ton. Road tar is unchanged at 10s. 6d. to 13s. per 40-gallon barrel. Crude tar has advanced slightly, and quotations are 25s. to 27s. per ton, f.o.r. maker's works. Whizzed naphthalene is slow at 80s. per ton,

SODIUM ACETATE CRYSTALS.—In steady demand at £22 to £23 per ton.
SODIUM BICHROMATE.—Unchanged at 3½d. per lb., with discounts for contracts.
SODA HYPO PHOTOGRAPHIC CRYSTALS.—In good steady demand at £14 10s. per ton to £15 per ton. The commercial grade is in improved demand at £8 10s. to £9 per ton.
SODIUM NITRITE is in steady request and unchanged at £20 per ton.
SODIUM PHOSPHATE.—Di-basic at £12 per ton, and tribasic at £17 per ton. Very firm and in good demand.
SODA PRUSSATE.—Very firm at 4½d. to 5½d. per lb., according to quantity.
TARTARIC EMETIC is firm at 11½d. per lb., and in steady demand.
ZINC SULPHATE is firm at £13 10s. per ton.

Coal Tar Products

There is no change to report regarding the market prices of coal tar products. As stated last week, stocks are not plentiful and inquiries are slow.

MOTOR BENZOL is unchanged at about 1s. 5½d. to 1s. 6d. per gallon, f.o.r. makers' works.

SOLVENT NAPHTHA is quoted at about 1s. 2½d. to 1s. 3d. per gallon, f.o.r.

HEAVY NAPHTHA is unchanged at about 1s. 1d. per gallon, f.o.r.

CREOSOTE OIL remains at 3½d. to 4d. per gallon on rails in the North, and at 4½d. per gallon in London.

NAPHTHALENES remain at about £4 10s. per ton for the firelighter quality, at £5 per ton for the 74/76 quality, and at £6 to £6 5s. per ton for the 76/78 quality.

PITCH is held firm at 45s. to 47s. 6d. per ton, f.o.b. East Coast port, buyers' marking time.

f.o.r., while a similar remark applies to crude at 70s. per ton, f.o.r. maker's works. Solvent naphtha is in moderate request at 1s. 3d. to 1s. 5d. per gallon. Creosote is in weak demand, with quotations ranging from 3½d. to 4½d. per gallon. Motor benzol is unchanged at 1s. 3½d. to 1s. 6d. per gallon. Higher prices are anticipated for sulphate of ammonia, and business has consequently been fairly good. Refined tars are unchanged, both coke oven and gasworks tar having a fair demand. Patent fuel and coke exports are unchanged. Patent fuel quotations are:—Ex-ship Cardiff, 22s.; ex-ship Swansea, 20s.; and ex-ship Newport, 20s. 6d. per ton. Coke quotations are:—Best foundry, 35s. to 37s.; good foundry, 30s. to 35s.; and furnace, 29s. to 30s. per ton. Oil imports over the last four ascertainable weeks amounted to 2,382,255 gallons, all from Persia.

Project for Australian Production of Pyrites

A SCHEME is now under way, through mining activity at Captain's Flat, near Canberra, Australia, to obtain pyrites to the amount of 50,000 tons per year. This would be equivalent to about 20,000 tons of sulphur, and would be sufficient to make 150,000 tons of superphosphates. It is not expected that maximum production will be possible within three or four years, and possibly a much longer period. Production of sulphuric acid from Australian sulphide ores is, however, being developed. For this reason, a recent request to have the import duty on pyrites removed was reported upon unfavourably by the Tariff Board. It was felt that the disadvantages of such a measure to the mining industry would be at least equal to any advantages which might accrue to the agriculturists.

Montecatini Control of Italian Lithopone Production

It is reported that the Montecatini company has purchased majority holdings in the Societa Italiana del Litopone, the only Italian producer of lithopone, with plants at Brescia. The Montecatini company already controls the only Italian plant for the manufacture of titanium oxide, and the largest Italian plant for the production of nitrocellulose lacquers. The board of directors of the Societa Italiana del Litopone will now be made up as follows: President, Comm. Guglielmo Galletti (general director of the Montecatini company), Dr. Franco Grottanelli, Ing. Alfredo Rook, Cav. Camillo Consonno, Dr. Hans Kühne, and Dr. Julius Schütz. The last two are connected with the I.G.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.

Glasgow, October 2, 1929.

THE Scottish heavy chemical market locally has been rather quiet since our last report, but export and inquiries still remain good. Prices remain practically on the same level as last reported.

Industrial Chemicals

ACETONE, B.G.S.—£76 10s. to £85 per ton, ex wharf, according to quantity. Inquiry remains satisfactory.

ACID ACETIC.—This material is still scarce for immediate supply, but prices remain unchanged as follows: 98/100% glacial £56 to £67 per ton, according to quality and packing, c.i.f. U.K. ports; 80% pure, £37 10s. per ton, ex wharf; 80% technical, £37 10s. per ton, ex wharf.

ACID BORIC.—Crystals, granulated or small flakes, £30 per ton. Powder, £32 per ton, packed in bags, carriage paid U.K. stations. There are a few fairly cheap offers made from the Continent.

ACID CARBOLIC, ICE CRYSTALS.—Prompt delivery difficult to obtain and prices now quoted for early delivery round about 8d. per lb., delivered or f.o.b. U.K. ports.

ACID CITRIC, B.P. CRYSTALS.—Quoted 2s. 2d. per lb., less 5%, ex store, prompt delivery. Rather cheaper offers for early delivery from the Continent.

ACID HYDROCHLORIC.—Usual steady demand. Arsenical quality, 4s. per carboy; dearsenicated quality, 5s. 6d. per carboy, ex works, full wagon loads.

ACID NITRIC, 80° QUALITY.—£24 10s. per ton, ex station, full truck loads.

ACID OXALIC, 98/100%.—On offer at about 3½d. per lb., ex store. Offered from the Continent at 3½d. per lb., ex wharf.

ACID SULPHURIC.—£2 15s. per ton ex works for 144° quality; £5 15s. per ton for 168°. Dearsenicated quality, 20s. per ton extra.

ACID TARTARIC, B.P. CRYSTALS.—Quoted 1s. 5d. per lb., less 5%, ex wharf. On offer for prompt delivery from the Continent at 1s. 4½d. per lb., less 5%, ex wharf.

ALUMINA SULPHATE.—Quoted at round about £7 10s. per ton, ex store.

ALUM, LUMP POTASH.—Now quoted £8 7s. 6d. per ton, c.i.f. U.K. ports. Crystal meal about 2s. 6d. per ton less.

AMMONIA ANHYDROUS.—Quoted 7½d. per lb., carriage paid. Containers extra and returnable.

AMMONIA CARBONATE.—Lump quality quoted £36 per ton, powdered £38 per ton, packed in 5 cwt. casks, delivered U.K. stations or f.o.b. U.K. ports.

AMMONIA LIQUID, 880°.—Unchanged at about 2½d. to 3d. per lb., delivered according to quantity.

AMMONIA MURIATE.—Grey galvanisers' crystals of British manufacture quoted £21 to £22 per ton, ex station. Fine white crystals offered from the Continent at about £17 5s. per ton, c.i.f. U.K. ports.

ANTIMONY OXIDE.—Spot material quoted £35 per ton, ex wharf. On offer for prompt shipment from China at £33 10s. per ton, c.i.f. U.K. ports.

ARSENIC, WHITE POWDERED.—Now quoted £18 per ton, ex wharf, prompt despatch from mines. Spot material still on offer at £19 15s. per ton, ex store.

BARIUM CHLORIDE.—In good demand and price about £11 per ton, c.i.f. U.K. ports.

BLEACHING POWDER.—British manufacturers' contract price to consumers unchanged at £6 12s. 6d. per ton, delivered in minimum 4 ton lots. Continental now offered at about the same figure.

CALCIUM CHLORIDE.—Remains unchanged. British manufacturers' price £4 5s. per ton to £4 15s. per ton, according to quantity and point of delivery. Continental material on offer at £3 12s. 6d. per ton, c.i.f. U.K. ports.

COPPERAS, GREEN.—Unchanged at about £3 10s. per ton, f.o.r. works, or £4 12s. 6d. per ton f.o.b. U.K. ports.

FORMALDEHYDE, 40%.—Remains steady at about £36 10s. per ton, ex works.

GLAUBER SALTS.—English material quoted £4 10s. per ton, ex station. Continental on offer at about £3 5s. per ton, ex wharf.

LEAD, RED.—Price now £37 per ton, delivered buyers' works.

LEAD, WHITE.—Quoted £37 10s. per ton, c.i.f. U.K. ports.

LEAD ACETATE.—White crystals quoted round about £39 to £40 per ton, ex wharf. Brown on offer at about £2 per ton less.

MAGNESITE, GROUND CALCINED.—Quoted £8 10s. per ton, ex store. In moderate demand.

METHYLATED SPIRIT.—Industrial quality 64 O.P. quoted 1s. 4d. per gallon less 2½% delivered.

POTASSIUM BICHROMATE.—Quoted 4½d. per lb. delivered U.K. or c.i.f. Irish ports, with an allowance of 2½% for minimum 2½ tons to be taken.

POTASSIUM CARBONATE.—Spot material on offer at £26 10s. per ton ex store. Offered from the Continent at £25 5s. per ton c.i.f. U.K. ports.

POTASSIUM CHLORATE, 99½/100% POWDER.—Quoted £25 10s. per ton ex wharf. Crystals 30s. per ton extra.

POTASSIUM NITRATE.—Refined granulated quality quoted £19 2s. 6d. per ton c.i.f. U.K. ports. Spot material on offer at about £20 10s. per ton, ex store.

POTASSIUM PERMANGANATE B.P. CRYSTALS.—Quoted 5½d. per lb., ex wharf.

POTASSIUM PRUSSIAN (YELLOW).—Spot material quoted 7d. per lb., ex store. Offered for prompt delivery from the Continent at about 6½d. per lb. ex wharf.

SODA, CAUSTIC.—Powdered 98/99% £17 10s. per ton in drums. £18 15s. per ton in casks. Solid 76/77% £14 10s. per ton in drums, and 70/75% £14 2s. 6d. per ton in drums, all carriage paid buyers' stations, minimum 4-ton lots, for contracts 10s. per ton less.

SODIUM BICARBONATE.—Refined recrystallised £10 10s. per ton, ex quay or station. M.W. quality 30s. per ton less.

SODIUM BICHROMATE.—Quoted 3½d. per lb. delivered buyers' premises with concession for contracts.

SODIUM CARBONATE (SODA CRYSTALS).—£5 to £5 5s. per ton, ex quay or station. Powdered or Pea quality 27s. 6d. per ton extra. Light soda ash £7 1s. 3d. per ton ex quay, minimum 4-ton lots with various reductions for contracts.

SODIUM HYPOSULPHITE.—Large crystals of English manufacture quoted £8 17s. 6d. per ton, ex station, minimum 4-ton lots. Pea crystals on offer at £14 15s. per ton, ex station, minimum 4-ton lots. Prices for this year unchanged.

SODIUM NITRATE.—Chilean producers are now offering at £9 9s. per ton, carriage paid buyers' sidings, minimum 6-ton lots, but demand in the meantime is small.

SODIUM PRUSSIAN.—Quoted 5½d. per lb., ex store. On offer at 5d. per lb., ex wharf to come forward.

SODIUM SULPHATE (SALTCAKE).—Prices 50s. per ton, ex works, 52s. 6d. per ton, delivered for unground quality. Ground quality 2s. 6d. per ton extra.

SODIUM SULPHIDE.—Prices for home consumption. Solid 60/62% £9 per ton. Broken 60/63% £10 per ton. Crystals 30/32% £7 2s. 6d. per ton delivered buyers' works on contract, minimum 4-ton lots. Special prices for some consumers. Spot material 5s. per ton extra.

SULPHUR.—Flowers, £12 per ton; roll, £10 10s. per ton; rock, £10 7s. 6d. per ton; ground American, £9 5s. per ton; ex store.

ZINC CHLORIDE, 98%.—British material now offered at round about £20 per ton, f.o.b. U.K. ports.

ZINC SULPHATE.—Quoted £10 per ton, ex wharf.

NOTE.—Please note that the above prices are for bulk business and are not to be taken as applicable to small quantities.

Alsation Potash Production

STATISTICS for the first six months of 1929 show a gain of a fifth, or 255,000 metric tons in the production of crude Alsation potash salts over the corresponding period of 1928. The output of crude salts during the first half of 1929 amounted to 1,493,769 metric tons, with a K₂O content of 235,430 tons, compared with 1,239,154 metric tons with a K₂O content of 193,968 tons for the January-June, 1928, period. The production of refined salts for the first six months of 1928 and 1929 are shown in the following table:

| | Per Cent. | January-June, 1928 Metric Tons. | January-June, 1929 Metric Tons. |
|-------------------|--------------|------------------------------------|------------------------------------|
| Sylvinite | 12-16 | 103,359 | 140,031 |
| Sylvinite | 20-22 | 307,046 | 331,606 |
| Sylvinite | 30 | 31,248 | 38,983 |
| Sylvinite | 37-40 | 45,021 | 60,315 |
| Chloride | 50-60 | 134,325 | 170,946 |
| Chloride | More than 60 | 25,121 | 27,860 |

The greatest increase in refined salts was in the sylvinite 12-16 per cent., and in the chloride 50-60 per cent.

Manchester Chemical Market

(FROM OUR OWN CORRESPONDENT.)

Manchester, October 3, 1929.

IN certain sections of the chemical market here during the past week, principally in the heavy materials, a fairly steady business both against contract commitments and on early delivery account has been transacted. Generally speaking, however, there has been little improvement in the aggregate, and although the price position is quite steady in most sections complaints from traders are still frequent regarding the keenness of the competition.

Heavy Chemicals

Hyposulphite of soda meets with a quiet demand, and there is relatively little change in values to be reported, the photographic kind being on offer at about £15 10s. per ton, and the commercial at £9 5s. Bichromate of soda keeps very firm at round 3½d. per lb. and a fair amount of inquiry for this material is reported. Saltcake seems to be well held at about £3 per ton, and offers at the moment appear to be less plentiful than they have been of late. Phosphate of soda meets with a quiet demand, with quotations this week at round £11 5s. per ton. With regard to caustic soda, contract prices in this section range from £12 15s. to £14 per ton, according to quality, and delivery specifications for fair quantities are reported to be coming forward. Prussiate of soda is fully maintained at from 4½d. to 5½d. per lb. according to quantity, and a moderate buying movement is being experienced. Chlorate of soda is on the easy side, if anything, at round 2½d. per lb., and sales are not too plentiful. Bicarbonate of soda is moving fairly regularly and quotations are firm on a contract basis of £10 10s. per ton. Offers of alkali are at round £6 per ton, and a moderate business is being done. There is a quiet demand about for sulphide of sodium, with the 60-65 per cent. concentrated solid quality quoted at about £9 per ton and the commercial grade at £8.

Among the potash products, bichromate is the subject of a fair amount of inquiry and values are quite steady at about 4½d. per lb. The demand for permanganate of potash is relatively slow but there has been little alteration in the price position, the B.P. grade selling at round 5½d. per lb. and the commercial at 5d. After some slight easiness during the past few weeks, carbonate of potash seems to be somewhat steadier at £25 per ton for the 96 per cent. material. Caustic potash is quoted at from £32 per ton, according to quantity, and a quietly steady business is being put through. Yellow prussiate of potash is well maintained at from 6½d. to 7½d. per lb. according to quantity, and inquiry is reasonably active. With regard to chlorate of potash there is only a quiet movement of this material, and at about 2½d. per lb. quotations in this section are not too firm at the moment.

Sulphate of copper remains steady at about £26 10s. per ton f.o.b.; buying interest, however, during the past week has been only on moderate lines. A quiet trade is passing in arsenic, with offers of white powdered, Cornish makes, at up to £16 5s. per ton at the mines. There has been little apparent improvement in the demand for the acetates of lime on this market; the brown quality is quoted at £8 5s. per ton and the grey at about £16 5s. The lead compounds—both acetates and nitrate—are in rather slow request; nitrate is on offer at round £33 per ton, and white and brown acetate at £39 10s. and £39 per ton, respectively.

Acids and Tar Products

A quiet trade is going through in the case of citric acid, and values are much the same as before, parcels being obtainable at down to 2s. 1d. per lb. Tartaric acid meets with some inquiry and prices are steady at 1s. 4½d. per lb. Acetic acid is firm and a fair business is passing in the commercial 80 per cent. quality at about £36 10s. per ton, glacial being quoted at £66. Oxalic acid is reasonably steady although in slow demand; current values are in the neighbourhood of £1 13s. per cwt. ex store.

There has been little improvement in the call for creosote oil, and prices are at from 3½d. to 4d. per gallon, naked, at works. Pitch is steady and in moderate request at up to 47s. 6d. per ton f.o.b. Carbolic acid crystals are scarce and in active demand, with prices firm at round 9d. per lb. f.o.b. for odd lots; 60's crude is quoted at 2s. 4d. per gallon. Solvent naphtha is maintained at about 1s. 2½d. per gallon, and a quietly steady business is being done in this material.

Company News

PORT SAID SALT ASSOCIATION.—An interim dividend of 2s. per share is announced.

BABCOCK AND WILCOX.—An interim dividend of 7 per cent. on the ordinary shares is to be paid, free of tax, for the half-year ended June 30.

LEVER BROTHERS.—The board have declared an interim dividend of 2½ per cent. (actual) on the ordinary shares, on account of the year 1929, the same as in September last year.

ANTOFAGASTA (CHILE) AND BOLIVIA RAILWAY Co.—The directors have declared an interim dividend of 3 per cent., less tax, on the consolidated ordinary stock on account of the year ending December 31 next.

NITRATE RAILWAYS Co.—An interim dividend at the rate of 2 per cent., i.e., 4s. per share, less income tax, has been declared, payable on November 5, on the ordinary (unconverted) and the preferred converted ordinary shares.

UNITED MOLASSES Co.—The directors have resolved to pay, on October 19, an interim dividend of 10 per cent., actual, less tax, on the increased issued ordinary capital of 2,984,087 shares, as against 8 per cent., less tax, on 1,500,000 shares last year.

INTERNATIONAL BITUMEN EMULSIONS.—The trading returns for the year ended March 31 last show a rapid expansion of business, state the directors in their report. The balance sheet shows sundry creditors and credit balances, £8,819, reserve for income tax £4,325, and balance for the year, less dividend paid, £14,559. Investments at cost stand at £88,227, and cash in hand and at bank £8,246.

AMALGAMATED ZINC (DE BAVAY'S).—The report for the six months to June 30 states that the income for the half-year was £9,874, comprising £6,493 interest and £3,581 dividends on shares in other companies, while the net profit was £5,936. Since the close of the period, dividend No. 45, at the rate of 8 per cent. per annum, has been declared, payable October 10. Liquid assets show a surplus over liabilities of £225,104, not including the amount paid on shares of other companies.

EVANS, SONS, LESCHER, AND WEBB.—In a circular to the preference shareholders the directors state that a full dividend was paid on the 6 per cent. participating cumulative preference shares in the company for the twelve months ending December 31, 1928, on April 8, 1929. In previous years the dividend for the preceding year ending December 31 had been paid as to one-half in April and one-half in October. While in the opinion of the directors the trading for the first six months of 1929 would warrant the payment of an interim dividend on the participating cumulative preference shares this autumn, they consider it is in the best interests of the shareholders to again wait until the accounts for the whole year can be reviewed before making any distribution. This will be in March, 1930.

Static Electricity in Weighing

A Possible Source of Error

IN a note just published in the *Journal of Chemical Education*, M. B. Geiger, of Georgetown College, Ohio, says that in the college laboratory appreciable errors in weighing, which may be accounted for by static electrical effects, have been noted.

In rapid weighing, when using a watch glass on the balance pan, the watch glass is dried between weighings by rubbing with a dry cloth. This gives rise to a static electrical charge which may be a source of error, especially if a metal spatula is used for transferring the solid being weighed and this spatula is not removed from the immediate vicinity of the watch glass when making a weighing. The writer of the note states that he has observed as much as nine milligrams difference in the weight of the object when the spatula is directly above the watch glass and when it is removed. Of course, this error is not created if the spatula is removed before a final balance is made. This static charge also proves to be a nuisance when weighing fluffy solids, as they are repelled from the watch glass and from each other much as pith balls repel each other when charged alike.

Both of these disadvantages may be avoided by first grounding the surface of the watch glass by touching various points on the rim with the metal spatula before the solid being weighed is placed on the watch glass. These static effects are most pronounced on dry, cold days and especially if the balances are located in a dry, cool place.

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Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

Mortgages and Charges

[NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case, the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.]

DUSSEK BITUMEN CO., LTD., London, E. (M., 5/10/29.) Registered September 14, £5,000 Land Registry charge and a mortgage collateral thereto, to C. H. Turnor, Stoke Rochford, Grantham; charged on Empress Wharf, Sherman Street, Bromley-by-Bow, and land and buildings at Barking. *Nil. September 28, 1929.

BRITISH AND GENERAL RADIUM CORPORATION, LTD., London, E.C. (M., 5/10/29.) Registered September 18, £12,500 (not exceeding) debenture, to British Bank for Foreign Trade, Ltd.; charged on ores, etc., and/or radium in any form at Trevarthian House, St. Austell, and South Terras Mine, Grampound Road.

Satisfactions

DACIA ROMANO PETROLEUM SYNDICATE, LTD., London, S.W. (M.S., 5/10/29.) Satisfaction registered, September 12, £200,000, registered December 29, 1922, and February 17, 1925.

HEPPELS, LTD., London, S.W., chemists. (M.S., 5/10/29.) Satisfaction registered September 13, £5,720, registered August 4, 1927.

Receivership

TAYLOR (H. C.) LTD. (R., 5/10/29.) C. E. Claridge, C.A., of 53, Well Street, Bradford, was appointed Receiver on September 14, 1929, under powers contained in debenture dated June 12, 1928.

London Gazette, &c.

Winding Up Petition

VICLEY AND CO., LTD. (W.U.P., 5/10/29.) A petition for winding-up has been presented by the Brico Commercial Chemical Co., Ltd.; and is to be heard at 20, St. Peter's Churchyard, Derby, on October 9, at 10 a.m.

Companies Winding Up Voluntarily

BITUMINOUS COMPOSITIONS, LTD. (C.W.U.V., 5/10/29.) By Special Resolution, September 11, confirmed September 27. A. G. Pearson, Chartered Accountant, 1, Town Hall Street, Grimsby, appointed as liquidator. Meeting of creditors at the offices of the Liquidator, on October 10, at 11.30 a.m.

LUBRICATING OIL RECOVERY CO., LTD. (C.W.U.V., 5/10/29.) By reason of its liabilities, September 20. M. W. H. Lancaster, 46, Basinghall Street, London, E.C.2, Chartered Accountant, appointed as liquidator. Meeting of creditors of the above at the office of the liquidator, on October 10, at 12 noon.

New Companies Registered

BALLABENE SIMMONDS AND CO., LTD., 232-8, Bishopsgate, London, E.C.2.—Registered September 26. Nominal capital £1,000 in £1 shares. Soap manufacturers, manufacturers and refiners of and dealers in all kinds of oils, oleaginous and saponaceous substances, etc. Directors: I. A. Ballabene, M. Simmonds, and M. Suvolsky.

BENJAMIN CHADWICK (1929), LTD.—Registered September 27. Nominal capital, £100 in £1 shares. Manufacturing, analytical and consulting chemists, druggists, indigo merchants and general drysalers; manufacturers of and dealers in oil and oleaginous and saponaceous substances, detergent compositions, soaps, toilet requisites, perfumes, candles, etc. A subscriber: W. Walker, 7, East Parade, Leeds.

DAVID SCOTT AND CO., LTD., 493, Aikenhead Road, Polmadie, Glasgow, S.2. Registered in Edinburgh on

September 26. Nominal capital £5,000 in £1 shares. To acquire the business of manufacturers of valves for oxygen, hydrogen, coal gas, carbonic acid and other high pressure gases and refrigerating plant, etc. Directors: R. Scott, J. Scott, and P. Hunter.

DUAMOILS [SYNDICATE, LTD., 151, Wool Exchange, Coleman Street, E.C.2. Registered as a "private" company on September 30. Nominal capital £100 in 1s. shares. To carry on the business of capitalists, financiers, financial and monetary agents, to establish or take interest in any part of the world in companies and associations for the prosecution or execution of projects of any kind, to take over and exploit options, rights and interests over lands, properties, stocks, shares and securities, and in particular over mineral and oil-bearing lands and rights, etc. Directors: N. Bogle-French, P. A. Slocombe (director of National Chemical Holdings, Ltd.) The file number is 242,624.

Trade Statistics

Plea for Fuller Publication

A STRONG appeal for the publication of fuller trade statistics as an aid to industrialists was made at the conference of works directors, managers, and foremen at Oxford on Friday, September 28, by Mr. William Wallace, economic adviser to Rowntree and Co. He said that an annual census of production was wanted instead of a five-yearly one. We wanted monthly figures of production in a simpler form, and published within 15 days of the end of the month. We needed to know what was the volume of production and what were the demands on that production. We did not want to run British industry with secondhand defective machinery, and we ought not to be asked to run it with defective statistics.

The speaker advised his hearers to go and knock at the door of a Government department and ask for the information they required. They would be surprised how much information would be given them. Until they had that information they could not hope to deal successfully with the great cyclical movements of industry, the alternate periods of boom and of depression. The State ought to give the Board of Trade the right to ask for certain figures and to get them, not through individual firms, but through the trade associations of the district.

The three main causes of the unsatisfactory condition of British industry were, first, the loss in the war of the generation which ought now to have been in charge of industry; secondly, the policy of deflation pursued in the interests of finance and with a complete disregard of the interests of industry; and thirdly, the failure to keep abreast of technical developments in industry during the post-war years.

Lignite Discoveries in Northern Ontario

AN official announcement has been issued at Toronto to the effect that a coalfield one mile long and half a mile wide has been located at Blacksmith Rapids, on the Abitibi River north of Cochrane, Ontario, capable of producing between 7,000,000 and 10,000,000 tons of high-grade lignite. The discovery is believed to be important, particularly in view of the fact that hitherto the province of Ontario has had to import its entire supply of coal either from the United States, from Alberta, or from Nova Scotia. The lignite found in the region of James Bay will presumably be utilised by industrial establishments in the form of pulverised fuel or as carbonised briquettes for domestic use.

Lautaro Nitrate Company Meeting

A SEPARATE general meeting of the holders of the 1,312,000 ordinary shares of £5 each of the Lautaro Nitrate Co., Ltd., was held on Tuesday at Winchester House, Old Broad Street, London, to pass resolutions for the modification of the rights of the "A," "B," and "C" ordinary shares, being the final resolutions in connection with the scheme of capital reorganisation. Mr. J. Hunter (director and secretary) presided. The resolutions were carried.

At an extraordinary general meeting held subsequently, the five resolutions passed at the extraordinary general meeting held on Monday, September 16, were confirmed.

